



The
University
Of
Sheffield.

“Sit Less at Work”: exploring contextual factors which influence intervention development, implementation and evaluation

By:

Kelly Josephine Mackenzie

A thesis submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

The University of Sheffield
Faculty of Medicine and Dentistry
School of Health and Related Research

March 2021

Abstract

Introduction

Prolonged periods of sitting, a common feature of sedentary jobs, are associated with increased morbidity and mortality. Evaluation of interventions to reduce workplace sitting have shown mixed results, suggesting impact also depends on context. This research, therefore, aimed to explore contextual factors that influence the development, implementation and evaluation of interventions to reduce workplace sitting time.

Methods

An integrative systematic review assessed effectiveness of interventions to reduce workplace sitting and explored key considerations for intervention development and implementation. Phase 1 involved a qualitative study to explore how barriers and facilitators to reducing workplace sitting time differed in four organisations of varying size and sector. Phase 2 developed and planned the implementation of organisation-specific interventions using ecological approaches and co-production. Phase 3 comprised a mixed-methods “before and after” study to assess the feasibility of implementation and evaluation and explored contextual barriers and enablers in three of the participating organisations.

Results

The review produced an operational framework which was tested during the three phases and then refined. Phase 1 highlighted barriers and enablers that differed across organisations including: organisational culture, the idea of presenteeism and wider political and economic influences. Phase 2 produced four “Sit Less at Work” interventions which targeted multiple levels of influence. Phase 3 identified no change in workplace sitting time, however, process evaluation determined that interventions were not implemented as intended. Key contextual barriers to implementation included: organisational culture, social norms of sitting, and lack of management buy-in.

Conclusion

Successful development, implementation and evaluation of interventions to reduce workplace sitting time requires careful consideration of contextual factors, particularly organisational culture and ingrained social practices. The evidence-based operational framework developed in this thesis can be used to ensure consideration is given to these factors to develop and deliver more effective interventions.

Word count: 293

Acknowledgements

This thesis would not have been possible without guidance and support from my three supervisors: Professor Liddy Goyder, Professor Paul Norman and Dr Liz Such. Liddy always made herself available when I needed advice and continually provided her excellent all-round expertise and mentorship. Paul helped me with specific queries, particularly regarding quantitative data analyses, imparting his knowledge and providing invaluable feedback throughout the PhD. Liz was a great support to me personally and professionally, providing her expert advice on the research field and always available to discuss the work over coffee and cake. Each of them provided me with their expertise and encouragement and also supported me personally upon my return to my PhD studies after a period of maternity leave.

I would also like to thank other academic and administrative colleagues who provided me with specific guidance and support. Firstly, Ben Heller, thank you for developing the spreadsheet, which enabled me to easily collate, analyse and interpret the data from the activPAL devices. Secondly, I would like to thank Susan Hampshaw who provided extremely useful insights into working with local authorities as well as support towards the end of my thesis. Thirdly, Michelle Black, thank you for listening to me when I needed to talk through issues and for proof-reading the thesis. Finally, I would like to thank Sue Wilson and the School of Health and Related Research Transcription Team for providing support transcribing the interviews and focus groups conducted as part of this research.

A few further notes of thanks. Thank you to the National Institute for Health Research (NIHR) for funding the research and my associated training. Thanks to John Batty (from Blue John Marketing) who provided extremely helpful advice on activities for the creative thinking workshops, which I used during the co-production of the interventions for this research. Thank you to Dr Nicholas Gilson who supported me during my secondment to the University of Queensland and arranged for me to meet various experts in the field of sedentary behaviour research which was invaluable to this work. Thank you to the public involvement team who gave up their time to ensure the research continued to be relevant and were instrumental in guiding the research through all the phases. Thank you to all the participants in this research. Thank you to the key contacts in each organisation who facilitated recruitment and meetings with participants and gave their time to support intervention implementation.

Last, but by no means least, I am most indebted to my family, whose patience, understanding and support has never wavered. I have experienced three exciting life events whilst conducting my PhD: getting married, moving house and welcoming my beautiful daughter into the world. Then, in the final months of my thesis, and just as I returned from maternity leave, the COVID-19 pandemic took hold, which added an extra layer of complexity to finishing the work. I could not have got through this PhD without the love, support and understanding of my husband, Kevin, my daughter, Iona, my parents, Iain and Elaine and my sister, Charlotte. This thesis is dedicated to them.

Contents

| | |
|---|-----------|
| Abstract | 2 |
| Acknowledgements | 3 |
| Contents | 4 |
| Declaration | 9 |
| List of publications based on this thesis | 9 |
| List of tables | 10 |
| List of figures | 11 |
| Abbreviations | 12 |
| Chapter 1: Setting the scene | 13 |
| 1.1. Chapter summary | 13 |
| 1.2. Key background information | 14 |
| 1.2.1. What is sedentary behaviour? | 14 |
| 1.2.2. Sedentary behaviour and health | 14 |
| 1.2.3. Sedentary behaviour versus physical activity | 16 |
| 1.2.4. Sitting in the workplace | 17 |
| 1.2.5. Summary of the evidence regarding interventions to reduce workplace sitting | 18 |
| 1.2.6. Summary of the gaps in the literature and how this research intends to address those gaps | 24 |
| 1.3. Project aims and objectives | 24 |
| 1.4. Research questions | 25 |
| 1.5. Study overview | 26 |
| 1.5.1. Public involvement panel | 26 |
| 1.5.2. Project branding | 27 |
| 1.5.3. Research paradigm of the primary researcher | 28 |
| 1.5.4. Study design | 29 |
| 1.6. Thesis structure | 30 |
| Chapter 2: Integrative systematic review of effectiveness of interventions to reduce workplace sitting time and key considerations for intervention development and implementation | 31 |
| 2.1. Chapter summary | 31 |
| 2.2. Aims and objectives | 32 |
| 2.3. Methods | 32 |
| 2.3.1. Study design | 32 |
| 2.3.2. Search strategy | 33 |
| 2.3.3. Inclusion and exclusion criteria | 33 |
| 2.3.4. Study selection | 34 |
| 2.3.5. Data extraction process | 36 |
| 2.3.6. Quality assessment tools | 36 |
| 2.3.7. Data synthesis | 38 |
| 2.4. Results | 39 |
| 2.4.1. Study characteristics | 39 |
| 2.4.2. Quality assessment | 41 |
| 2.4.3. Quantitative narrative synthesis | 42 |
| 2.4.4. Qualitative thematic synthesis | 44 |
| 2.4.5. Integrative analysis | 50 |
| 2.4.6. Intervention framework development | 51 |

| | | |
|---|---|-----------|
| 2.5. | Discussion | 54 |
| 2.5.1. | Quantitative findings – intervention effectiveness and key study characteristics..... | 54 |
| 2.5.2. | Qualitative findings for the development and implementation of interventions and the development of an evidence-based framework | 56 |
| 2.5.3. | Strengths and limitations of the review | 58 |
| 2.6. | Conclusions..... | 58 |
| Chapter 3: Phase 1 – Understanding barriers and enablers to sitting less at work in organisations of different size and sector | | 60 |
| 3.1. | Chapter summary | 60 |
| 3.2. | Background..... | 60 |
| 3.3. | Aims and objectives..... | 62 |
| 3.4. | Methods | 62 |
| 3.4.1. | Organisations..... | 62 |
| 3.4.2. | Participants..... | 63 |
| 3.4.3. | Procedures..... | 64 |
| 3.4.4. | Analysis | 65 |
| 3.5. | Results | 66 |
| 3.5.1. | Individual factors | 68 |
| 3.5.2. | Organisational factors | 69 |
| 3.5.3. | The internal physical environment..... | 72 |
| 3.5.4. | The broader social, economic and political context..... | 73 |
| 3.6. | Discussion | 75 |
| | Implications for research and practice | 79 |
| | Strengths and limitations | 79 |
| 3.7. | Conclusions..... | 80 |
| Chapter 4: Phase 2 – Development of “Sit Less at Work” interventions and plans for implementation | | 81 |
| 4.1. | Chapter summary | 81 |
| 4.2. | Background..... | 81 |
| 4.2.1. | Theoretical model..... | 82 |
| 4.2.2. | Participatory approach: Co-production..... | 85 |
| 4.3. | Applying the operational framework to Phase 2 | 88 |
| 4.3.1. | Theoretical model..... | 88 |
| 4.3.2. | Participatory approach | 88 |
| 4.3.3. | Developing and implementing interventions | 88 |
| 4.3.4. | Embedding the intervention in local policy or gaining high-level management support | 89 |
| 4.3.5. | Taking into account real-world contextual factors..... | 89 |
| 4.4. | Aims and objectives..... | 90 |
| 4.5. | Methods | 90 |
| 4.5.1. | Workshop 1 | 91 |
| 4.5.2. | Workshop 2 | 91 |
| 4.5.3. | “Sit Less at Work” intervention development..... | 92 |
| 4.5.4. | Implementation plans | 92 |
| 4.6. | Results | 92 |
| 4.6.1. | Intervention development | 92 |
| 4.6.2. | Plans for implementation | 103 |
| 4.6.3. | Participant feedback on the workshops..... | 104 |
| 4.7. | Discussion | 106 |

| | | |
|---|---|------------|
| 4.7.1. | Intervention development..... | 106 |
| 4.7.2. | Plans for implementation | 108 |
| 4.7.3. | Feedback on the co-production approach | 109 |
| 4.7.4. | The benefits and weaknesses of co-production | 109 |
| 4.7.5. | Strengths and limitations..... | 110 |
| 4.8. | Conclusions..... | 111 |
| Chapter 5: Phase 3 – Process and outcome evaluation of the “Sit Less at Work” interventions..... | | 112 |
| 5.1. | Chapter summary | 112 |
| 5.2. | Background..... | 113 |
| 5.3. | Aims and objectives..... | 114 |
| 5.4. | Methods..... | 115 |
| 5.4.1. | Participant recruitment | 116 |
| 5.4.2. | Inclusion and exclusion criteria | 116 |
| 5.4.3. | Procedures | 117 |
| 5.4.4. | Data collection – process data..... | 118 |
| 5.4.5. | Data collection – outcome measures | 119 |
| 5.4.6. | Data analysis | 120 |
| 5.5. | Results..... | 124 |
| 5.5.1. | Participant characteristics | 124 |
| 5.5.2. | Process evaluation | 126 |
| 5.5.3. | Primary outcome data | 139 |
| 5.5.4. | Secondary outcome data..... | 142 |
| 5.6. | Discussion | 148 |
| | Implications for research and practice | 152 |
| | Strengths and limitations..... | 153 |
| 5.7. | Conclusion | 154 |
| Chapter 6: Discussion and conclusion..... | | 155 |
| 6.1. | Chapter summary | 155 |
| 6.2. | Summary of the work undertaken during this PhD research programme | 155 |
| 6.3. | Summary of the key findings from this research programme..... | 156 |
| 6.3.1. | Based on existing evidence, which interventions are effective at reducing workplace sitting time? | 156 |
| 6.3.2. | What are the key considerations for the development and implementation of interventions to reduce workplace sitting? | 157 |
| 6.3.3. | What are the barriers and enablers to reducing workplace sitting time? | 157 |
| 6.3.4. | Do these barriers and enablers differ between organisational contexts? | 158 |
| 6.3.5. | Is co-production a feasible way to develop interventions to reduce workplace sitting?..... | 159 |
| 6.3.6. | How does the intervention content differ between workplace settings? | 159 |
| 6.3.7. | Is it feasible to implement interventions in different organisational contexts with minimal researcher involvement?..... | 160 |
| 6.3.8. | Is it feasible to evaluate interventions using a variety of quantitative and qualitative measures in different organisational contexts? | 161 |
| 6.4. | What is the role of organisational context on the development, implementation and evaluation of interventions to reduce workplace sitting time? | 162 |
| 6.4.1. | Organisational culture | 164 |
| 6.4.2. | Social factors..... | 166 |
| 6.4.3. | Organisational characteristics | 168 |

| | | |
|---|---|------------|
| 6.4.4. | The internal environment..... | 169 |
| 6.4.5. | Wider economic and political factors..... | 170 |
| 6.4.6. | The external environment..... | 170 |
| 6.5. | Key implications for research and practice | 172 |
| 6.5.1. | Implications for intervention design and implementation | 172 |
| 6.5.2. | Implications for future research directions..... | 173 |
| 6.6. | The refined development, implementation and evaluation operational framework..... | 174 |
| 6.7. | Implications of the COVID-19 pandemic on the findings from the research | 177 |
| 6.8. | Strengths and limitations | 178 |
| 6.8.1. | Strengths..... | 178 |
| 6.8.2. | Limitations | 179 |
| 6.9. | Overall contribution of this research and final conclusions..... | 181 |
| 6.9.1. | Empirical contributions | 181 |
| 6.9.2. | Methodological contributions | 182 |
| 6.9.3. | Theoretical contributions | 182 |
| 6.9.4. | Final conclusions..... | 183 |
| References | ..... | 184 |
| Appendix 1 | ..... | 200 |
| a: | Public involvement recruitment post | 200 |
| b: | Public involvement initial presentation and related handouts..... | 202 |
| c: | Initial public involvement meeting agenda | 208 |
| d: | Summary of discussions from public involvement meetings | 209 |
| e: | Branding brief and feedback from public involvement panel..... | 214 |
| Appendix 2 | ..... | 217 |
| a: | PROSPERO Protocol | 217 |
| b: | Amendments to the original PROSPERO protocol | 226 |
| Appendix 3: Study characteristics and quality assessment tables | ..... | 228 |
| Appendix 4 | ..... | 247 |
| a: | Phase 1 recruitment email and participant information sheet | 247 |
| b: | Phase 1 consent form..... | 252 |
| c: | Phase 1 and 2 ethics application..... | 253 |
| d: | Phase 1 and 2 ethics approval letter | 262 |
| Appendix 5: Phase 1 baseline questionnaire | ..... | 263 |
| Appendix 6 | ..... | 264 |
| a: | Phase 2 recruitment email and participant information sheet | 264 |
| b: | Phase 2 consent form..... | 268 |
| Appendix 7 | ..... | 269 |
| a: | Phase 2 Workshop 1 outline..... | 269 |
| b: | Phase 2 Workshop 2 outline and idea planning proforma worked example..... | 271 |
| c: | Phase 2 questionnaires for Workshop 1 and 2 | 274 |
| Appendix 8: Ideas from Workshop 1 by organisation and level of influence | ..... | 278 |
| Appendix 9: Detailed description of actions by organisation | ..... | 282 |
| Appendix 10 | ..... | 291 |
| a: | Communication templates for each participating organisation..... | 291 |
| b: | Briefing note for Directors meeting at local authority | 307 |
| c: | “Sit Less at Work” presentation at local authority | 309 |
| Appendix 11: Feedback from Workshops 1 and 2 by organisation | ..... | 311 |

| | |
|--|------------|
| Appendix 12: Phase 3 recruitment emails and participant information sheets | 318 |
| Appendix 13..... | 335 |
| a: Phase 3 consent forms..... | 335 |
| b: Phase 3 ethics application | 340 |
| c: Phase 3 ethics approval letter | 348 |
| Appendix 14: activPAL logbook and information sheet..... | 349 |
| Appendix 15: Phase 3 questionnaires for T0, T1 and T2 | 354 |
| Appendix 16: Phase 3 focus group/interview questionnaire | 372 |
| Appendix 17: Phase 3 topic guides for focus groups and interviews | 373 |
| Appendix 18: Individual-level primary outcome data | 380 |
| Appendix 19: Posters used by local authority as part of the “Sit Less at Work” intervention | 382 |

Declaration

I, Kelly Josephine Mackenzie, confirm that the Thesis is my own work. I am aware of the University's Guidance on the Use of Unfair Means (www.sheffield.ac.uk/ssid/unfair-means). This work has not been previously been presented for an award at this, or any other, university.

List of publications based on this thesis

Peer-reviewed journal publications:

Mackenzie K, Such E, Norman P, Goyder E (2019). Sitting less at work: a qualitative study of barriers and enablers in organisations of different size and sector. *BMC Public Health*, 19;884, DOI: 10.1186/s12889-019-7148-8.

Mackenzie K, Such E, Norman P, Goyder E (2018). The development, implementation and evaluation of interventions to reduce workplace sitting: a qualitative systematic review and evidence-based operational framework. *BMC Public Health*, 18;833, DOI: 10.1186/s12889-018-5768-z.

Conference Proceedings:

Mackenzie K, Such E, Norman P, Goyder E (2018). Involving staff in the development of sit less at work packages. National Institution for Health Research Trainee Meeting, November 2018.

Mackenzie K, Such E, Norman P, Goyder E (2018). Barriers and facilitators to sitting less at work in different organisations: a qualitative study. Public Health Science Conference, November 2018. *The Lancet*, 392(S56), [https://doi.org/10.1016/S0140-6736\(18\)32885-X](https://doi.org/10.1016/S0140-6736(18)32885-X).

Mackenzie K, Goyder E, Norman P, Such E (2018). "Sit Less @Work" – developing an evidence-based framework to support the development, implementation and evaluation of interventions to reduce workplace sitting. 7th International Society of Physical Activity and Health Congress, London, England, October 2018. *Journal of Physical Activity and Health*, 15(S1).

Mackenzie K, Goyder E, Norman P, Such E (2018). Sit Less @Work: A framework for the development, implementation & evaluation of workplace sitting interventions. School of Health and Related Research Postgraduate Research Conference, University of Sheffield, England, May 2018.

List of tables

| | |
|------------|---|
| Table 2.1: | Search strategy |
| Table 2.2: | Descriptive and analytic themes |
| Table 3.1: | Organisation characteristics |
| Table 3.2: | Focus groups topic guide |
| Table 3.3: | Participant characteristics |
| Table 3.4: | Summary of key themes and sub-themes by organisation |
| Table 4.1: | Participant characteristics for workshops 1 and 2 |
| Table 4.2: | Examples of outputs from workshop 1 by organisation |
| Table 4.3: | Small business 12-week action plan summary |
| Table 4.4: | Charity 12-week action plan summary |
| Table 4.5: | Local authority 12-week action plan summary |
| Table 4.6: | Large corporation 12-week action plan summary |
| Table 5.1: | Participant characteristics (those who wore the activPAL3 devices) |
| Table 5.2: | Participation numbers during the intervention with reasons for drop-outs provided |
| Table 5.3: | Awareness of the “Sit Less at Work” intervention in the small business |
| Table 5.4: | Awareness of the “Sit Less at Work” intervention in the charity |
| Table 5.5: | Awareness of the “Sit Less at Work” intervention in the local authority |
| Table 5.6: | Objective sitting time at T0, T1 and T2 from activPAL3 data |
| Table 5.7: | Effect sizes by organisation for changes in objective sitting time from T0 to T1 and T2 |
| Table 5.8: | % daily sitting time on a working and non-working day for each organisation at T0, T1 and T2 |
| Table 5.9: | Subjective vs objective % sitting time at work for participants from the three organisations at the three time points |
| Table 5.10 | Self-reported % time spent on different work activities for each organisation at each time point |
| Table 5.11 | Domain-specific sitting time for working days and non-working days for each organisation at each time point |
| Table 5.12 | Self-reported general health and wellbeing for each organisation at each time point |
| Table 5.13 | Health and work performance for each organisation at each time point |

List of figures

- Figure 1.1: The final “Sit Less at Work” branding logo
- Figure 1.2: Summary of the study design and methods used
- Figure 2.1: PRISMA flowchart of study selection process
- Figure 2.2: Sit less at work intervention development, implementation and evaluation operational framework
- Figure 4.1: Ecological model of sedentary behaviour
- Figure 4.2: The ladder of co-production
- Figure 5.1: Individual-level data for small business participants at T0, T1 and T2
- Figure 5.2: Individual-level data for charity participants at T0, T1 and T2
- Figure 6.1: Summary of factors identified in the current research that relate to organisational context during the development, implementation and evaluation of interventions
- Figure 6.2: Refined sit less at work intervention development, implementation and evaluation operational framework

Abbreviations

| | |
|----------|--|
| BMI | Body Mass Index |
| CASP | Critical Appraisal Skills Programme |
| CI | Confidence Interval |
| COM-B | Competence, Opportunity, Motivation Behaviour Change Model |
| COVID-19 | Coronavirus Disease 2019 |
| HR | Hazard Ratio |
| HR | Human Resources |
| IPAQ | International Physical Activity Questionnaire |
| MD | Managing Director |
| MET | Metabolic Equivalent |
| MRC | Medical Research Council |
| NHS | National Health Service |
| NICE | National Institute for Health and Care Excellence |
| NIHR | National Institute for Health Research |
| OR | Odds Ratio |
| OSPAQ | Occupational Sitting and Physical Activity Questionnaire |
| PRISMA | Preferred Reporting Items for Systematic Reviews and Meta-Analyses |
| RCT | Randomised Controlled Trial |
| RR | Risk Ratio |
| SCT | Social Cognitive Theory |
| SEM | Social Ecological Model |
| SF36 | Short Form 36 Questionnaire |
| TPB | Theory of Planned Behaviour |
| UK | United Kingdom |
| WHO | World Health Organisation |
| WSQ | Workforce Sitting Questionnaire |

Chapter 1: Setting the scene

1.1. Chapter summary

Prolonged periods of sedentary behaviour are known to be associated with poor health and premature mortality. Due to the increase in office-based jobs over recent decades and the fact adults spend the majority of their waking hours at work, the workplace has been identified as a setting where prolonged sedentary behaviour is a particular concern. Subsequently, there has been an increase in published studies evaluating interventions to support staff to be less sedentary (i.e., to sit less) during office-based work, but these interventions have shown mixed results. Furthermore, how these interventions were developed and implemented in the target organisation is often not clear, which can limit the external validity and generalisability of the findings, particularly when considering the range of organisations in terms of size and sector.

The overall focus of this PhD research programme was therefore on the issue of sedentary behaviour in the workplace. Specifically, the research presented in this thesis aimed to explore contextual factors which influence the development, implementation and evaluation of “Sit Less at Work” interventions in office-based organisations of different size and sector. The research was funded by the National Institute for Health Research (NIHR) as part of a doctoral research fellowship undertaken by the primary researcher.

This introductory chapter provides the context and rationale for this research and encompasses:

- A review of key background information including:
 - a definition of sedentary behaviour
 - a summary of the evidence linking sedentary behaviour to poor health
 - a brief discussion of the debate regarding the importance of sedentary behaviour versus physical activity
 - why the workplace is an important setting to target sedentary behaviours
 - the evidence relating to effectiveness of interventions to reduce workplace sitting time
 - and how this project plans to address gaps in the current literature
- The aims and objectives of the research
- The main research questions the research intended to address
- A description of the public involvement during this research and project branding
- A description of the study design
- An overview of the thesis structure.

1.2. Key background information

1.2.1. What is sedentary behaviour?

Sedentary behaviour is defined as any waking behaviour with an energy expenditure ≤ 1.5 Metabolic Equivalents while in a sitting or reclining posture [1]. For research purposes, sedentary behaviour is most commonly operationalised as time spent sitting, as this can be easily distinguished from light intensity physical activity such as standing and walking, which have been shown to confer some health benefits due to the additional musculoskeletal load [2, 3].

Sedentary behaviour is not the same as physical inactivity. Physical inactivity is defined as *not* meeting the government recommended guidelines for physical activity, which, for adults in the United Kingdom (UK), is 150 minutes of moderate intensity activity or 75 minutes of vigorous intensity activity in bouts of ten minutes or more spread across the week [4]. It is possible for individuals to be physically active, i.e., meet the physical activity guidelines, but still to spend a large proportion of their day engaging in sedentary behaviours. In the UK, therefore, the current recommendations also include: minimising the amount of time spent being sedentary; and when possible, breaking-up long periods of inactivity with at least light intensity physical activity.

Unlike the physical activity guidelines, the sedentary behaviour evidence base has been considered insufficient to provide suggested timings for the maximum amount of time an adult should spend being sedentary or the frequency of breaks to sedentary time [5]. More recently, however, Canada have developed 24-hour movement guidelines [6], which take into account all types of movement behaviours throughout the day. As well as recommending moving more (including both moderate-to-vigorous and light intensity activities) and sleeping well, these guidelines suggest limiting sedentary time to eight hours or less including no more than three hours of recreational screen-time and breaking-up long periods of sitting as often as possible. Nevertheless, a systematic review of interventions to reduce sedentary time in adults concluded that, clinicians and public health practitioners should focus on providing advice on *how* to reduce total volume of sitting time and break-up long periods of sitting rather than focus on providing specific time limits for time spent sitting [7].

1.2.2. Sedentary behaviour and health

The potential hazards of prolonged sitting were first identified in the 1950s in a landmark study by Morris et al. [8]. This study prospectively followed the incidence of coronary heart disease in London bus drivers and conductors and found that drivers (who spent the majority of their working day sitting at the wheel of the bus) were twice as likely to suffer from a myocardial infarction (heart attack) as the conductors (who spent their working days on their feet collecting tickets) [8]. The conclusion from this study was that physical activity is protective against (not that sedentary behaviour was a risk factor for) coronary heart disease [8]. Decades of

research have subsequently focussed on the association between physical activity or physical inactivity and health [9].

In recent years however, research has begun to highlight the potential deleterious health impacts of sustained sedentary behaviours [10–12]. Specifically, prolonged sedentary behaviour has been found to be associated with an increased risk of chronic health issues, such as: cardiovascular disease [13–15]; metabolic syndrome/type 2 diabetes [13, 15–20]; hypertension [21]; some cancers [22, 23]; and depression and anxiety [24–26]. A range of risk/odds/hazard ratios have been reported for the associations between prolonged sedentary behaviour and the aforementioned conditions. For instance, a review of prospective studies found that risk estimates associated with fatal and non-fatal cardiovascular disease ranged from 16% (hazard ratio (HR) 1.16, 95% confidence interval (CI) 1.02 to 1.30) to 68% (HR 1.68, 95% CI 1.07 to 2.64) higher for the highest level of sitting time compared with the lowest levels of sitting time after adjustment for a series of covariates (including measures of physical activity) [14]. Increasing time spent in sedentary behaviours by an hour per day was associated with an increased odds of hypertension of 2% (odds ratio (OR) 1.02, 95% CI 1.003 to 1.03) [21]. Furthermore, when comparing the highest versus the lowest levels of sedentary behaviour, findings from meta-analyses reported:

- a 91% increased risk of type 2 diabetes (pooled HR 1.91, 95% CI 1.64 to 2.22) [12]
- a 73% increased risk of metabolic syndrome (OR 1.73, 95% CI 1.55-1.94) [17]
- a 30% increased risk of colon cancer (risk ratio (RR) 1.30, 95% CI 1.22 to 1.39) [23]
- a 25% increased risk of depression (RR 1.25, 95% CI 1.16 to 1.35) [27].

All-cause mortality has shown one of the most consistent associations with prolonged sedentary behaviours [15, 18–20, 28–30]. When adjusted for physical activity levels, one meta-analysis reported an increased risk of all-cause mortality of 4% (RR 1.04, 95% CI 1.03 to 1.05) for each additional hour of sitting for those already sitting for >8 hours per day [20]. Another meta-analysis reported a 5% (HR 1.05, 95% CI 1.02 to 1.08) increased risk of all-cause mortality for each additional hour sitting for adults sitting >7 hours per day (after adjusting for physical activity and other covariates) [29]. Furthermore, it has been reported that there is reasonable evidence for a causal relationship between sedentary behaviour and all-cause mortality based on Bradford Hill's epidemiological criteria of strength of association, consistency of effect, and temporality [31]. Finally, there is consistent experimental evidence that regular breaks from sitting (starting with standing, with more benefit from moving) can help to improve factors associated with cardiometabolic health (post-prandial glucose and insulin levels) [32], and can reduce musculoskeletal pain and discomfort [33].

A cost-of-illness analysis [34] estimated the direct health costs of prolonged sitting to the National Health Service (NHS) in the UK was £0.7 billion in the financial year 2016-17. The results stated that 11.6% of all-cause mortality was associated with sedentary behaviour, meaning over 69,000 deaths might have been avoided in 2016 if sedentary behaviour was eliminated in the UK. For the purpose of this analysis, sedentary

behaviour was defined as ≥ 6 hours per day. It was not clear what the wider costs, such as productivity losses to the workforce, were to society. Reducing sedentary behaviour could in turn help to reduce the overall burden of disease and associated health costs and, hence, it has been identified as an important public health concern [35].

1.2.3. Sedentary behaviour versus physical activity

Participation in regular physical activity to improve and/or manage both physical and mental health has been widely accepted for decades [36–38]. However, the health effects of prolonged periods of sedentary behaviour have received much less attention until recent years. Sedentary behaviour is of particular interest in today's modern society, as it has increasingly infiltrated our lives across many settings including transportation, home and the workplace [39] and, hence, there has been a rapid accumulation of epidemiological evidence [13, 40]. In 2011, the Chief Medical Officers of the UK published the report 'Start Active, Stay Active: a report on physical activity for health' [41] which, for the first time, provided recommendations on sedentary behaviour. The report recommended both children and adults should keep the amount of time being sedentary for prolonged periods to a minimum, but no specific time limits were suggested. These recommendations are important as a large population survey in England subsequently reported that around one third of adults spend >6 hours per day being sedentary [42]. Furthermore, as data from this survey were based on self-report, it is likely that this figure is an underestimate [43].

As the issue of sedentary behaviour has become more prominent in the research world, there has been an increasing debate over where the emphasis needs to be placed in terms of public health messaging, i.e., should the focus be on meeting the physical activity guidelines or on sitting less or both. There is conflicting evidence regarding whether the risks for poor health associated with sedentary behaviour are independent of the effects of physical activity [35, 44, 45], or whether physical activity can attenuate the risks associated with prolonged sedentary behaviour [28, 46, 47]. A paper by Ekelund et al. [46], published as part of The Lancet physical activity series in 2016, tried to redirect the current research emphasis from sedentary behaviour back to physical activity. This paper reported findings from a systematic review and meta-analysis which aimed to answer the following question, "if one is active enough, will this attenuate or even eliminate the detrimental association of daily sitting time with mortality?" [46]. This comprehensive review looked at 16 prospective cohort studies which, in total, included over one million participants. Studies were included if they reported individual-level exposure and outcome data, provided data on both daily sitting or television-viewing time and physical activity, and reported effect estimates for all-cause, cardiovascular, or cancer mortality. This review found that those who were exercising for 60-75 minutes per day at a moderate intensity, but who still sat for more than eight hours per day, had a significantly lower risk of mortality than those who sat for less than four hours per day, but were active for only about five minutes per day. These findings suggest that high levels of physical activity can eliminate the increased risk of all-cause mortality associated with prolonged total daily sitting time and that high levels of physical activity are more protective than simply sitting less. However,

these findings only held true for those participating in the highest levels of physical activity of 60-75 minutes of moderate intensity physical activity *per day*. This level of physical activity is much higher than the UK recommended guidelines for adults of 150 minutes of moderate intensity activity *per week*, which 37% of UK adults are currently not achieving [48], and it is likely that this figure is an underestimate as it is based on self-report [49].

Achieving the level of physical activity required to eliminate the risks associated with prolonged sitting is unlikely to be feasible for most people, meaning that the risks associated with prolonged sitting still remain and should continue to be a focus of public health initiatives [50]. In addition, evidence has found an inverse relationship between sedentary behaviour and light physical activity, suggesting that sedentary behaviour could displace time spent in light physical activity rather than moderate to vigorous intensity physical activity [51]. Hence, reductions in sedentary time could result in an increase in light intensity physical activity, i.e., sitting time is likely to be replaced by activities such as standing and walking. In order to lower the risks to health, reducing sitting time may be of particular relevance to workers in sedentary occupations where it is much more feasible to replace periods of sitting with bouts of light physical activity than participating in over an hour per day of moderate intensity exercise. Therefore, as well as promoting the physical activity guidelines, there is also a need to specifically target and reduce prolonged sitting [28, 50].

1.2.4. Sitting in the workplace

There are several domains where prolonged sitting could occur, such as during leisure-time, transportation, school and the workplace. Prolonged sitting in the workplace is a particular concern for several reasons. First, over recent decades, occupational sectors that were previously more physically demanding, e.g., goods production and agriculture, have transitioned to less strenuous work involving more sitting because of both interventions to improve health and safety at work and technological advancements aimed at increasing productivity [52]. Second, the more physically demanding occupations have overall decreased whereas occupations largely composed of sitting and office-based work, e.g., administration and customer services, have increased [53]. This increase is likely due to the rise of the information economy which has resulted in an increase in work tasks which require being sat at a computer [52]. Third, adults spend approximately 60% of their waking hours in the workplace [54, 55] and observational studies suggest that office workers in England spend 63% of their total daily sitting time, sitting at work [56]. Finally, a systematic review that focused specifically on workplace sitting and health risks found a positive association with body mass index, type 2 diabetes, cancer, cardiovascular disease and mortality (based on findings from observational studies) [19]. It is this recognition of the increasing prevalence of sedentary occupations and the contribution the workplace makes to the health risks associated with prolonged sitting that has highlighted the need for the development of interventions to reduce workplace sitting time [57]. Studies which have focused on such interventions have since emerged [58–63].

A variety of tools have been used to measure sitting time in the workplace, including subjective measures such as questionnaires and self-report data [64–66] as well as objective measures such as inclinometers [59, 61] and accelerometers [67, 68]. Although self-report measures of sitting time have been demonstrated to result in large bias, poor precision and low correlation with objective measures of sitting time [43], a tool for measuring workers' sitting time by domain, the Workforce Sitting Questionnaire (WSQ), has been determined as having acceptable measurement properties for measuring sitting time at work on a workday and for assessing total sitting time based on work and non-workdays [69]. More recently, objective measures of sitting time have been used such as inclinometers (e.g., activPAL) [59, 61] and accelerometers (e.g., ActiGraph) [67, 68], with activPAL being advocated as the “gold standard” measurement tool for assessing sitting time as it can more precisely distinguish between sitting, standing and stepping and is more sensitive to reductions in sitting time when compared to ActiGraph [70].

1.2.5. Summary of the evidence regarding interventions to reduce workplace sitting

In 2010, Chau et al. [71] conducted the first systematic review on the effectiveness of interventions to reduce workplace sitting time. Six studies met the inclusion criteria of workplace interventions aimed at increasing physical activity or decreasing sitting time, which specifically measured sitting time as a primary or secondary outcome. This review found that none of the included studies reported a significant difference in sitting time between intervention and control groups. A variety of explanations for this were provided including methodological limitations of the included studies (e.g., the lack of randomised controlled designs), the use of subjective measures of sitting time and the fact that for all six studies sitting time was a secondary outcome; the primary outcome was physical activity. Chau et al. therefore recommended better quality studies, using objective measures of sitting time, which aim for a reduction in workplace sitting time as a primary outcome.

Since the systematic review in 2010, many intervention studies have been published in which reduction in workplace sitting time was the primary outcome. Several more recent systematic reviews examining the effectiveness of workplace sitting interventions in office or white-collar workers have now been conducted [72–77].

First, a review by Neuhaus et al. [72] aimed to establish the impact of activity permissive workstations on workers' sedentary time, adiposity and other health and work-related outcomes, as well as feasibility and acceptability outcomes. Activity permissive workstations were classified as either fixed standing desks, sit-stand desks, treadmill desks or cycle ergometers/pedal devices fitted underneath the desk. Any study design (with or without a control group) that evaluated before and after intervention measures of any of the outcomes stated in the aim was included in this review. All included studies were qualitatively synthesised and studies using a controlled design and reporting overall and/or workplace sedentary time were also synthesised via a meta-analysis, although Cohen's *d* effect sizes were not reported. Thirty-eight studies met the inclusion criteria and of these 13 reported overall and/or workplace sedentary time (across 14

independent comparisons). Eleven of the 14 comparisons reported a significant reduction in sedentary time with an average reduction in workplace sedentary time of 90 minutes per 8-hour workday (range: -8 to -143; eight studies) and in overall sedentary time of 111 minutes per day (range: -59 to -182; three studies). The pooled effect size from the meta-analysis was a reduction in sedentary time of 77 minutes per 8-hour workday (95% CI: -120 to -35). These findings suggest that activity-permissive workstations could be effective at reducing workplace sedentary time.

Second, a systematic review by Tew et al. [73] primarily aimed to determine the effectiveness of sit-stand desks in reducing objectively measured sitting time. Randomised and non-randomised controlled trials that evaluated interventions aimed at reducing workplace sitting time using sit-stand desks either alone or as part of a multicomponent intervention were included. Secondary objectives of this review were to assess the effects of sit-stand desk on other outcome measures such as sedentary behaviour and other health outcomes, so studies that reported at least one of the following were included in the review: objective measure of workplace sitting time, self-reported workplace sitting time, cardiovascular events, musculoskeletal health, mental health and objectively measured body composition. Five studies met the inclusion criteria and underwent narrative synthesis. Four of these reported on the primary outcome of this review and all four demonstrated a statistically significant reduction, suggesting sit-stand desks could be a useful intervention strategy to reduce workplace sitting time. However, no pooling of the data was undertaken and no effect sizes were calculated.

Third, a systematic review and meta-analysis conducted by Chu et al. [74] aimed to: summarise the effectiveness of interventions to reduce workplace sitting from studies that used a controlled trial design; and to determine the comparative effectiveness of different intervention strategies including educational/behavioural (e.g., goal-setting, action planning, self-monitoring of behaviour, motivational interviewing, prompts/cues), environmental (e.g., sit-stand desks, treadmill workstations, pedal machines) and multicomponent (i.e., educational/behavioural and environmental strategies) interventions. Studies were included that assessed interventions targeting workplace sitting time and used either objective (e.g., via accelerometry) or subjective (e.g., questionnaires or activity diaries) outcome measures of sedentary behaviour. Twenty-six studies met the inclusion criteria and were qualitatively synthesised; 21 studies were synthesised quantitatively using meta-analysis. Of the 26 studies, 12 reported significant reductions in workplace sitting time, nine reported non-statistically significant reductions in workplace sitting time, and five reported no effect. The pooled intervention effect of the 21 studies included in the meta-analysis was a significant reduction in workplace sitting of -39.6 minutes per 8-hour workday (95% CI: -51.7 to -27.5), favouring the intervention group. In terms of effectiveness of different intervention strategies, pooled results for: three (out of five) multicomponent interventions demonstrated a reduction in workplace sitting time of -88.8 minutes per 8-hour workday sitting (95% CI: -132.7 to -44.9); six (out of six) environmental-level interventions indicated a reduction of -72.8 minutes per 8-hour workday (95% CI: -104.9 to -40.6); and 12 (out

of 15) educational/behavioural-level interventions reported a reduction of -15.5 minutes per 8-hour workday (95% CI: -22.9 to -8.2). Thus, no single intervention strategy could be identified as being the most effective, although multicomponent and environmental interventions resulted in the greatest reductions in workplace sitting time. Individual study or pooled Cohen's *d* effect sizes were not reported.

Fourth, a systematic review undertaken by Commissaris et al. [75] aimed to establish whether sedentary behaviour could be effectively reduced and/or physical activity increased by any intervention implemented at the workplace that intended to change employees' behaviour whilst undertaking productive work, e.g., walking to a colleague's desk or the printer but not activities during lunch breaks or commuting to and from work. Controlled studies that evaluated interventions to decrease sedentary behaviour and/or increase physical activity, which were implemented to have effects during productive work were included in this review. Forty studies describing 41 interventions were included in a qualitative best-evidence synthesis. The interventions were categorised into one of three types: alternative workstations, i.e., sit-stand desks or activity-permissive workstations (n=20); interventions promoting stair use (n=11); and personalised behavioural interventions, i.e., motivating workers to change their behaviour by establishing goal-setting; and/or providing feedback on their behaviours via prompts or messages (n=10). The review found that alternative workstations resulted in a decrease in overall sedentary behaviour. However, the evidence was mixed regarding the effectiveness of alternative workstations at reducing sedentary behaviour at work; some studies reported a positive effect in favour of the intervention group, whereas others reported similar effects for the intervention and control group. The evidence for personalised behavioural interventions in reducing workplace sedentary behaviour was also mixed and in terms of effects on overall sedentary behaviour, the evidence was insufficient. Further, there was insufficient evidence relating to interventions promoting stair use on decreasing overall or workplace sedentary behaviour.

Fifth, Hutcheson et al. [76] focused on determining the effectiveness of only environmental-level interventions (e.g., sit-stand desks, treadmill workstations, pedal machines) to reduce workplace sitting time. All study designs were included in this review provided they were intervention studies with the primary aim of reducing workplace sitting time. Fifteen articles met the inclusion criteria. The quantitative data were presented, but synthesised qualitatively. The findings of this review demonstrated that 14 of the interventions resulted in a significant reduction in at least one measure of sedentary behaviour, with statistically significant reductions in sitting time during the workday, ranging from 18 to 233 minutes.

Finally, a Cochrane systematic review [77] aimed to evaluate the effects of workplace interventions at reducing workplace sitting time. Controlled trials (randomised controlled trials (RCTs), cross-over RCTs, cluster RCTs, quasi-RCTs and controlled before and after studies) with the primary aim of reducing workplace sitting time measured objectively or subjectively were included in this review. Various intervention strategies were included such as physical changes to the workplace environment, policies to change the organisation of work, information and counselling to encourage employees to sit less, and multicomponent interventions. Thirty-

four studies met the inclusion criteria and were synthesised qualitatively, 19 studies were also quantitatively synthesised using meta-analysis. The studies were reviewed by intervention type with some pooling of effects where it was possible; although no overall effect size was calculated. Results showed that sit-stand desks when used either alone or in combination with information and counselling, demonstrated an average reduction in workplace sitting time of 100 minutes per workday (95% CI: -116 to -84; 10 studies) at three-month follow-up when compared to no intervention. The pooled effect of two studies with longer follow-up (three to 12 months) showed sit-stand desks reduced workplace sitting time by an average of 57 minutes per day (95% CI: -99 to -15) compared to no intervention. Results for active workstations (treadmill desks and pedalling desks) were inconsistent. Two included studies looked at the effect of policy changes (walking strategies) on workplace sitting time and reported non-statistically significant reductions of -15 minutes per day (95% CI: -50 to 19) and -17 minutes per day (95% CI: -61 to 28). One study implemented a short breaks policy (one-to-two minutes every hour) and reported a reduction in time spent sitting at work of 40 minutes per day (95% CI: -66 to -15) compared to long breaks (two 15-minute breaks per workday). Two studies that looked at the effects of information and counselling found a statistically significant reduction in workplace sitting time of -28 minutes per day (95% CI: -51 to -5) at three to 12 months follow-up. One study that evaluated mindfulness training did not produce any statistically significant changes to workplace sitting time (-23 minutes per day, 95% CI: -63 to 17). Similarly, one study, which provided highly personalised or contextualised feedback, and one study that assessed activity trackers, found no significant changes in sitting time at work. The use of computer prompts plus information had inconsistent effects with three studies reporting no considerable effects on workplace sitting time at short-term (up to three months) follow-up (-14 minutes per day, 95% CI: -39 to 10) and one reporting a significant reduction in workplace sitting time at three to 12 months follow-up (-55 minutes per day, 95% CI: -96 to -14). Multicomponent interventions showed an inconsistent effect on workplace sitting time with a reduction in sitting time at 12 weeks and six months follow-up in two studies but no statistically significant effect at 12 months follow-up in another. The findings suggest that, at least in the short-term, the use of sit-stand desks could be effective in reducing workplace sitting time, but other intervention strategies yield inconsistent or statistically non-significant results.

The reviews presented above looking at the effectiveness of interventions to reduce workplace sitting suggest that intervention strategies that include sit-stand/standing desks could be effective, at least in the short-term. In contrast, other intervention strategies have demonstrated inconsistent results. However, it is noteworthy that there was no assessment of participant adherence to the interventions in any of the reviews. In the review by Hutcheson et al. [76] only one of the included studies, which tested a multicomponent intervention involving a portable pedal machine [78], reported high intervention adherence. Therefore, there is a need to develop more pragmatic, low-cost interventions to encourage greater uptake amongst employers, for whom the cost of sit-stand/standing desks could be a significant barrier to implementation. The focus on low-cost interventions has been highlighted in a Cochrane review, which stated,

“there is a need to conduct trials on low-cost interventions (standing meetings, posters or prompts for standing, printers or dust-bins placed further) for decreasing sitting, which would be very useful particularly in small offices and resource scarce settings” [78].

It is difficult to draw firm conclusions from the above summary of systematic review findings as each review used different inclusion criteria: some included only specific intervention strategies, e.g., environmental-level interventions such as sit-stand desks [72, 73, 76], others included a range of intervention strategies [74, 75, 77]; some included only controlled (randomised and non-randomised) trials [73–75, 77], others included controlled trials as well as non-experimental, single arm study designs [72, 76]. None of the reviews looked at both a range of intervention strategies and a wide variety of study designs. These issues are important because intervention strategies with the potential to be effective in real-world contexts could be being missed or not fully explored within these reviews. This is in part due to the primary emphasis of current research practices being on determining causality and intervention impact (i.e., internal validity) rather than generalisability and the ability for the intervention to be scaled-up (i.e., external validity) [79]. Therefore, a broad synthesis of all study designs which have tested any type of intervention(s) is needed.

Furthermore, due to the mixed findings from these reviews, it is not clear which low-cost intervention strategies could be effective. There is a need for further work into contextual factors that influence sitting time (in order to develop suitable interventions) and a more detailed consideration of how such interventions are implemented. As outlined by the Medical Research Council (MRC) [80, 81], understanding factors which could affect the implementation of complex interventions is key for policymakers and practitioners to determine whether such interventions would be effective in different contexts. Understanding these contextual factors could then work to optimise the intervention benefits, prolong sustainability and promote dissemination of findings into other organisations, settings or contexts [82]. For instance, one factor could relate to the idea that the nature of sitting in the workplace is not simply an individual-level behaviour but is a social practice with associated social norms. In order to achieve behaviour change, a wider understanding of local organisational culture is needed rather than simply educating employers or employees to the benefits of sitting less. A recent study looking into office workers’ experiences of standing in normally-seated meetings [83] elicited marked psychological discomfort due to concerns at being seen to be breaking a strong perceived sitting norm. Overcoming these norm barriers can be achieved by organisations explicitly supporting sit less initiatives to empower their employees to participate without fear of infringing social expectations [83]. This organisational buy-in needs to involve adopting a sit less at work culture, which will thereby support the promotion of such initiatives.

MRC guidance for developing and evaluating complex interventions [84] recommends the inclusion of user involvement in all stages of the development, process and outcome evaluation of the intervention. As a result, co-production of interventions to reduce workplace sitting time has been advocated by many researchers as a way of ensuring staff buy-in and that the intervention is tailored to the specific needs of the organisation [64,

85–87]. The use of co-production to develop interventions could provide a further way of addressing organisational context.

Interventions could be ineffective due to poor design, but they could also be ineffective due to poor implementation [81]. Thus, an intervention that has been shown to be effective in one context, may not necessarily be effective when transferred to another, i.e., the external validity of the intervention is unknown [79]. This could be a particular issue for interventions set within the workplace given the variations that exist in terms of size, sector and culture. Many studies have looked at a range of different interventions to reduce workplace sitting, but only in single organisations [59, 88, 89], and where more than one organisation was evaluated, there was no discussion about the impact organisational context could have on the implementation of such interventions [90–92]. Further, the authors of the Cochrane review [77] suggested that the presently available qualitative research regarding employee and employer views about interventions to decrease sitting time should be synthesised. Therefore, exploring: a) contextual factors identified by researchers as important in the implementation of such interventions [93]; and b) employer/employee views on barriers and enablers to sitting less at work [77], could help to improve both the development and implementation of such interventions. Explicit reporting of this information would, in turn, allow policymakers, practitioners and researchers to determine whether an intervention is suited to their specific context. There is no existing synthesis of factors which influence the development and implementation of office-based sitting interventions. This gap in the literature needs addressing, as this will provide the evidence required to understand more fully how such interventions can be implemented in real-world settings, thereby enhancing external validity and generalisability.

Given the wide range of intervention strategies and study designs used to encourage employees to sit less at work, a synthesis of both the presently available quantitative and qualitative data would be of interest to researchers and policymakers looking into interventions. Furthermore, the translation of these findings into an operational framework would provide a useful and actionable tool for researchers and policymakers to consider when developing and implementing such interventions. There is a generic framework available, developed by the MRC, for the development and evaluation of complex interventions [84, 93], although this framework is in the process of being updated to be more relevant to the evaluation of real-world interventions and will not focus so heavily on the importance of research methods [94]. However, given the variations in workplace settings/contexts (e.g., size, sector and culture) and the wide range of intervention strategies demonstrated in the literature above, it could be useful to have a more tailored framework for sitting less at work. If followed, such a framework could provide some consistency in approaches taken by researchers and policymakers, making further data synthesis more structured and allowing comparisons across workplaces to be made more easily. Using a framework will also ensure that key barriers and enablers to intervention development and implementation are systematically examined and addressed [95]. At present, no tool or

framework exists which is specifically designed to support the development and implementation of interventions to reduce workplace sitting time.

1.2.6. Summary of the gaps in the literature and how this research intends to address those gaps

Previous systematic reviews, which have primarily focused on intervention effectiveness, suggest interventions using sit-stand/standing desks can be effective, but have reported wide variations in terms of intervention content, context, effect sizes and sustainability of behaviour change. Other, more low-cost intervention strategies have demonstrated mixed results. Further, there is uncertainty as to whether efficacy in controlled trials can be replicated when implemented outside the research setting impacting the real-world generalisability of the existing research. A framework to support the development and implementation of interventions to reduce workplace sitting time could be useful to take account of organisational context and provide some consistency in approaches taken by researchers and policymakers. Such a framework would then need to be tested to establish whether it is “fit for purpose” and subsequently refined as necessary.

The background information highlighted several gaps in the literature including the lack of: a systematic review which synthesises data from all sit less at work interventions and all study designs; understanding of contextual factors which influence the development and implementation of such interventions in a range of organisations; testing of low-cost interventions in order to remove the financial barrier to implementation from employers; an operational framework tailored to the development and implementation of interventions.

The current research sought to address these gaps by:

- Undertaking a synthesis of research using all study designs which have tested any type of intervention(s)
- Undertaking a synthesis of factors which influence the development and implementation of interventions
- Developing an operational framework to provide a useful and actionable tool for researchers and policymakers to consider when developing and implementing interventions
- Testing the operational framework by developing, implementing and evaluating more pragmatic, low-cost interventions in organisations of different size and sector.

1.3. Project aims and objectives

Based on the gaps in the literature, the primary aim of the research was to:

- Explore contextual factors that influence the development, implementation and evaluation of low-cost interventions to reduce workplace sitting in organisations of different size and sector.

A secondary aim was to develop, test and refine an operational framework for the development, implementation and evaluation of workplace sitting interventions.

In order to address the above aims, the project objectives were to:

1. Undertake a systematic review to:
 - a. Determine the effectiveness of interventions to reduce workplace sitting time
 - b. Understand contextual factors that influenced the development and implementation of these interventions
 - c. Develop an operational framework to support the subsequent development and implementation of workplace sitting interventions (during Phases 1-3)
2. Recruit four participating organisations of different size and sector to test out the operational framework
3. Explore existing barriers and facilitators to reducing workplace sitting from staff and managers from the four participating organisations and to explore the similarities and differences across the organisations (Phase 1)
4. Co-produce and plan the implementation of low-cost interventions with staff in each participating organisation and to explore the similarities and differences in intervention development across the organisations (Phase 2)
5. Implement the interventions in each of the participating organisations for 12-weeks, and to explore the similarities and differences in intervention implementation across the participating organisations (Phase 3)
6. Undertake a feasibility study which incorporates a mixed-methods process and outcome evaluation of the interventions, in order to understand the feasibility of implementing and evaluating the interventions, intervention effectiveness and how the interventions were implemented (Phase 3)
7. Use the findings from Phases 1, 2 and 3 to further refine the operational framework developed as part of Objective 1c
8. Undertake public involvement work throughout the project to gain advice on research procedures and to ensure the on-going relevance and applicability of the research in the “real-world”.

1.4. Research questions

The primary research question was: What is the role of organisational context on the development, implementation and evaluation of interventions to reduce workplace sitting time?

Secondary research questions included:

1. Based on existing evidence, which interventions are effective at reducing workplace sitting time?
2. What are the key considerations for the development and implementation of interventions to reduce workplace sitting?
3. What are the barriers and enablers to reducing workplace sitting time?
4. Do these barriers and enablers differ between organisational contexts?

5. Is co-production a feasible way to develop interventions to reduce workplace sitting?
6. How does the intervention content differ between workplace settings?
7. Is it feasible to implement interventions in different organisational contexts with minimal researcher involvement?
8. Is it feasible to evaluate interventions using a variety of quantitative and qualitative measures in different organisational contexts?

1.5. Study overview

1.5.1. Public involvement panel

During the planning stages of the research (and to support the NIHR doctoral research fellowship application), the primary researcher set up a public involvement panel to help guide the initial study design. These members of public were recruited by targeting members of a local gym on social media (see Appendix 1a for recruitment post). Fifteen volunteers expressed an interest and five were able to attend the initial meeting. The meeting was held at the University of Sheffield over lunchtime in December 2015. Lunch was provided to the volunteers and each panel member was paid a nominal fee of £30 to cover their time and any expenses incurred. The primary researcher presented the research plans to the panel (see Appendix 1b for a copy of the presentation and related handouts). During the meeting, members of the public involvement panel were invited to: advise on whether or not the proposed research was important and viable; and suggest changes or highlight any relevant issues with the planned research (see Appendix 1c for the meeting agenda).

Below is a summary of discussions from this initial meeting. How those directly contributed to the study design is written in bold.

- After the health impacts of prolonged sitting were explained, it was felt that the proposed research was very important and should be carried out.
This gave supporting evidence for the need to carry out this research, as it was felt to be an important area to focus on by members of the public, not just researchers.
- As well as recruiting public and private sector organisations, it was suggested that the voluntary sector should also be included given their limited funding for workplace health interventions.
Voluntary sector organisations were approached to take part in this research.
- It was advised that specific participants should be identified and asked to volunteer to participate in the study to ensure a range of views were obtained from people with various job roles within an organisation and so those participants could encourage others to get involved.
This method was used throughout the research to help ensure a wide range of views were obtained.

- The interventions should run for 12 weeks, as any less would not provide enough time to demonstrate effects, any longer and organisations could find it difficult to commit.

The interventions ran for 12 weeks in each workplace.

- The use of monitoring devices (activPAL3) to collect data on sitting time at work would be acceptable to most people, particularly with the understanding that it is the most reliable measure.

Monitoring devices (activPAL3) were used to collect data on workplace sitting time.

- Only minor changes were suggested to the language used in the plain English summary. Specific advice was given to ensure some lengthy sentences were broken up to aid understanding.

All suggested changes were incorporated into the plain English summary submitted as part of the NIHR doctoral research fellowship application.

This same panel were involved throughout the research, meeting with the primary researcher on a further four occasions and providing additional input via email to inform the on-going project. Each meeting was conducted at the University of Sheffield, during lunchtime, with lunch and refreshments provided and each panel member received £30 to cover their time and any expenses incurred. The details of these further meetings can be found in Appendix 1d. Where the support received from the panel relate to specific parts of the research programme, this is highlighted at the relevant point in the thesis.

1.5.2. Project branding

Developing project branding to use as part of the interventions ensured that the any communications relating to the interventions looked professional and were instantly recognisable by participants. In order to develop some branding, a member of the public involvement panel suggested contacting a local art and design college to see if they would be interested in getting involved as part of a student project. The primary researcher requested help from a local college advising that a fee could be paid to the college in exchange for their support. The tutor suggested that, instead of a fee being paid to the college, the project could be a competition for students with a cash prize for the winner. On this basis, a project brief was set for the development of the branding and having collected submissions from the students, the tutor shared a shortlist of four submissions. The primary researcher then shared these submissions with the public involvement panel for feedback (see Appendix 1e for a copy of the branding brief and feedback from the public involvement panel). The final project logo used as part of the interventions and during communications about the research programme with participants is shown in Figure 1.1. Note, when used as part of the intervention, the word “Work” was removed and replaced with the participating organisation logo and the colour scheme of the logo was changed so it was in line with the organisation logo colour scheme.

Figure 1.1 The final “Sit Less at Work” branding logo



1.5.3. Research paradigm of the primary researcher

How researchers view ‘truth’ and reality (ontology), ways of knowing and understanding (epistemology), and ways of attaining knowledge (methodologies) all have implications on their research, hence it is important to identify these assumptions at the outset [96]. There is a spectrum of research paradigms with positivism at one end and constructivism at the other [97]. Positivists believe in a single truth which can be measured; and to determine this truth, deductive reasoning is applied and objective, often quantitative methods adopted [96]. In contrast, constructivists believe that there are multiple realities, and knowledge needs to be interpreted to discover underlying meaning [96]. This interpretation is achieved via inductive reasoning and the use of subjective, qualitative methods [96]. Somewhere between these two paradigms sits pragmatism.

The work presented in this PhD thesis is located within the pragmatic paradigm. The pragmatic paradigm has been defined as

“A worldview that focuses on “what works” rather than what might be considered absolutely and objectively “true” or “real.” [98]

In addition, Dewey, an early proponent of pragmatism, highlighted the importance of focusing on the consequences of actions rather than determining the true reality/realities [99]. The ontological stance of a pragmatist is that reality forever shifts; it is tentative and will change over time, so what we see today could change in the future [100]. Pragmatists are concerned with the meaning of relationships and the interplay between knowledge and action; creating knowledge in the interest of change and improvement in the real-world [101]. Furthermore, pragmatists believe that ideas/concepts can be understood by reviewing their practical consequences and producing actionable knowledge [102]. The related epistemology is that knowledge should be examined using the most appropriate tools to solve the problem. The pragmatist methodology is therefore not defined, but is simply that which is most useful and appropriate for answering the research question [103]. As such, mixed-methods (i.e., the use of qualitative methods such as focus groups and interviews, and quantitative methods such as questionnaires and objective measures) can be

adopted. This makes pragmatism an appropriate paradigm for research intending to intervene in the real-world [101], which is the basis of the work in this thesis.

1.5.4. Study design

First, an integrative systematic review was conducted to assess the effectiveness of interventions to reduce workplace sitting time and to explore factors important for the development and implementation of such interventions. An integrative review allows for the inclusion of diverse methodologies, integrates qualitative and quantitative data, and can be used to provide a deeper understanding of a phenomenon [104]. The main outcome of this review was the proposal of an operational framework for the development, implementation and evaluation of sit less at work interventions, which was then tested and refined in subsequent phases of this project, as follows:

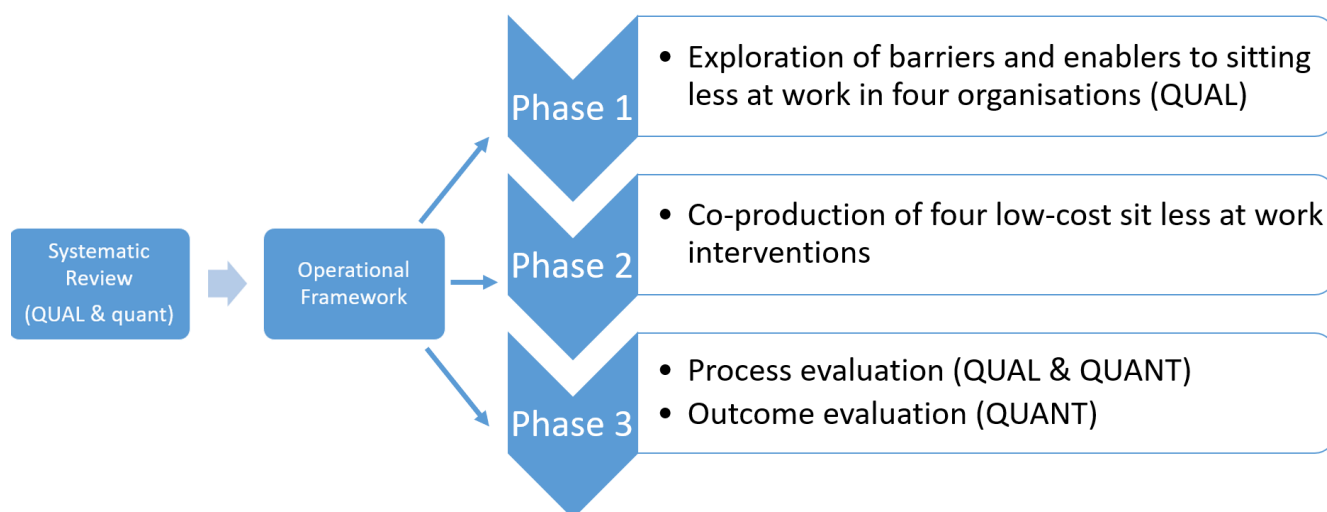
- Phase 1 involved a qualitative study utilising focus groups to understand barriers and facilitators to reducing workplace sitting time and to compare and contrast these across the four participating organisations of different sizes and sectors.
- Phase 2 utilised findings from Phase 1 and a participatory approach to intervention development. This phase consisted of workshops facilitated by the primary researcher using co-production techniques to allow employees from each of the four participating organisations to develop bespoke, low-cost “Sit Less at Work” interventions.
- Phase 3 comprised a mixed-methods feasibility study to assess the feasibility of implementing and evaluating the co-produced interventions using qualitative and quantitative measures and integrating these findings into a mixed-methods synthesis. The NIHR in the UK defines feasibility studies as, “...pieces of research done before a main study in order to answer the question “Can this study be done?”. They are used to estimate important parameters that are needed to design the main study. For instance: willingness of participants to be randomised; number of eligible patients, carers or other appropriate participants; follow-up rates, response rates to questionnaires, adherence/compliance rates” [105].

Furthermore, feasibility studies are seen as an important preliminary step prior to formal outcome evaluation, according to the MRC in their guidance on the development and evaluation of complex interventions [84]. This feasibility study utilised both quantitative and qualitative research methods, also consistent with the MRC guidance [84].

Phase 1 provided the evidence required to support intervention development, Phase 2 focussed on developing the interventions and plans for implementation, and Phase 3 involved the implementation and evaluation of the interventions. Figure 1.2 summarises the research plan and highlights the mixed-methods used in the different phases of the project and which method (qualitative or quantitative) dominated each phase. Phase 1 was dominated by qualitative research. The process evaluation part of Phase 3 primarily involved qualitative methods, but some quantitative work was also involved. The outcome evaluation part of Phase 3 involved

purely quantitative methods. As Phase 2 involved co-production, no formal research methods were used, instead a participatory approach to intervention development was used.

Figure 1.2: Summary of the study design and methods used



NB: “QUAL” – qualitative work dominates this phase; “QUANT” – quantitative work dominates this phase; “quant” – quantitative work conducted, but not the main focus of this phase.

1.6. Thesis structure

Having described the background and rationale for this study in Chapter 1, Chapter 2 presents the integrative review of effectiveness of interventions to reduce workplace sitting time and identifies key considerations which are important for intervention development and implementation. Findings from this review were used to produce an operational framework to support the development, implementation and evaluation of interventions to reduce workplace sitting time (note: the qualitative part of the review and framework development has been published [106]). Chapter 3 then describes Phase 1, which encompassed a qualitative study looking into barriers and enablers of sitting less at work in organisations of different size and sector (note: this study has also been published [107]). Chapter 4 presents Phase 2, which involved the development and implementation plans for interventions to reduce workplace sitting time in organisations of different size and sector. Chapter 5 describes Phase 3, reporting on the implementation and process and outcome evaluation of these interventions. Finally, Chapter 6 provides a final discussion and overall conclusions and, based on the findings from all phases of this PhD, presents a refined version of the operational framework.

Chapter 2: Integrative systematic review of effectiveness of interventions to reduce workplace sitting time and key considerations for intervention development and implementation

2.1. Chapter summary

This chapter presents an integrative systematic review which expands the current evidence-base regarding intervention effectiveness and key considerations for intervention development and implementation. Four health and social science databases were searched for all intervention evaluation study designs set in the workplace, involving office-based employees and with the primary aim of reducing workplace sitting. Extracted data included: study design, study setting, participant information, intervention description, outcome data and measurement tools used. Qualitative data were primarily from author descriptions of interventions and their implementation. Effect sizes were calculated (where possible) and a narrative synthesis conducted. An inductive thematic analysis and synthesis was undertaken for the qualitative data.

Forty studies met the inclusion criteria. The calculated effect sizes were extremely wide ranging, demonstrating a spectrum from trivial differences to large effect sizes. The inductive synthesis identified nine descriptive themes from which emerged three higher-order analytical themes, which related to the development, implementation and evaluation of workplace sitting interventions. Key findings included: the importance of theory-driven interventions; utilising participative approaches during intervention development and implementation; and conducting comprehensive process and outcome evaluations. There was a general under-reporting of information relating to the context within which workplace sitting interventions were implemented, such as details of local organisation processes and structures, as well as the wider political and economic landscape. If such details were present, it would aid the translation of knowledge into real-world settings.

This novel qualitative synthesis provided a useful operational framework to support the development and implementation of interventions to reduce workplace sitting time. The framework is a representation of all nine descriptive themes and three higher-order analytical themes, to support intervention development, implementation and evaluation. This framework could be used when planning future research into workplace sitting interventions or for implementing interventions in the real-world. The framework produced as a result of this review has been used to develop and implement sit less at work interventions in different organisations, the description of which will form the remainder of this thesis.

2.2. Aims and objectives

This integrative systematic review aimed to:

1. Determine which interventions for reducing workplace sitting time are effective
2. Identify key considerations important for the development and implementation of interventions
3. Use these findings to develop an operational framework to support the future development and implementation of sit less at work interventions.

In order to achieve these three aims, an integrative review was conducted. Quantitative data on intervention effectiveness and qualitative data from participant responses (where available), author descriptions of the intervention and the context within which an intervention was implemented, were extracted and synthesised.

The objectives of this integrative review were to:

- a) Undertake a literature search using appropriate inclusion and exclusion criteria to select relevant studies from a systematic search of the literature
- b) Extract relevant quantitative and qualitative data from the included papers to address the aims of this review
- c) Undertake a quantitative narrative synthesis to determine intervention effectiveness
- d) Conduct qualitative evidence analysis via thematic synthesis to identify key considerations for intervention development and implementation
- e) Translate the findings of the qualitative synthesis into an operational framework to support the development and implementation of interventions to reduce workplace sitting time.

2.3. Methods

The preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines were used for this review [108].

2.3.1. Study design

An integrative systematic review was conducted, which utilised a quantitative narrative synthesis and qualitative evidence synthesis. The review protocol was published via PROSPERO (Registration Number CRD42016052703 – see Appendix 2a), although there were some iterative alterations to the methods outlined in the protocol which are detailed further in Appendix 2b.

2.3.2. Search strategy

Four electronic databases covering a wide range of relevant sources were searched in January 2017: Web of Science Core Collection; MEDLINE; PsycINFO; CINAHL. The searches were limited to English language, full-text papers. No restrictions were placed on dates of publication. In addition, citation searches were carried out by examining the reference lists of relevant reviews to identify further studies. Grey literature was also searched for by reviewing Google, Google Scholar and Mendeley.

The search strategy used the terms as shown in Table 2.1. The following Boolean logic was used to extract articles from databases: 1 (Population/setting) AND 2 (Intervention) AND 3 (Outcomes). Filters within the databases were set to select only English language papers, with no limit to the date of publication.

Table 2.1: Search strategy

| | Terms |
|------------------------------|---|
| 1. Population/setting | ((Employee OR staff OR workforce OR worker OR occupation OR workplace OR desk OR office) NOT (Child OR adolescent OR school)) |
| 2. Intervention | (Education OR counselling OR prompt* OR reminder* OR management support OR sit-stand OR stand* OR workstation*) |
| 3. Outcomes | (Sedentary OR sitting OR inactivity) |

NB: "Comparison" and "Study Design" terms were not used as part of the PICOS search strategy as studies with and without comparator groups and all study designs were to be included in this review

2.3.3. Inclusion and exclusion criteria

Papers were included if they met the following criteria:

- Study participants were employed adults in desk-based jobs whose occupations involved spending the majority of their working time sitting at a desk, e.g., administration, customer service, help-desk professions, call-centre workers, receptionists, academics.
- Any intervention with the primary aim of reducing workplace sitting time, including both single-level and multicomponent interventions.
- The primary outcome was workplace sitting time measured objectively, e.g., using accelerometer devices, or subjectively, e.g., using self-report.
- Study designs including uncontrolled or controlled trials, RCTs, observational studies, before and after studies, qualitative studies, and mixed-methods studies.
- Papers associated with the primary study, e.g., protocol papers, intervention development papers and qualitative papers.

Papers were excluded based on:

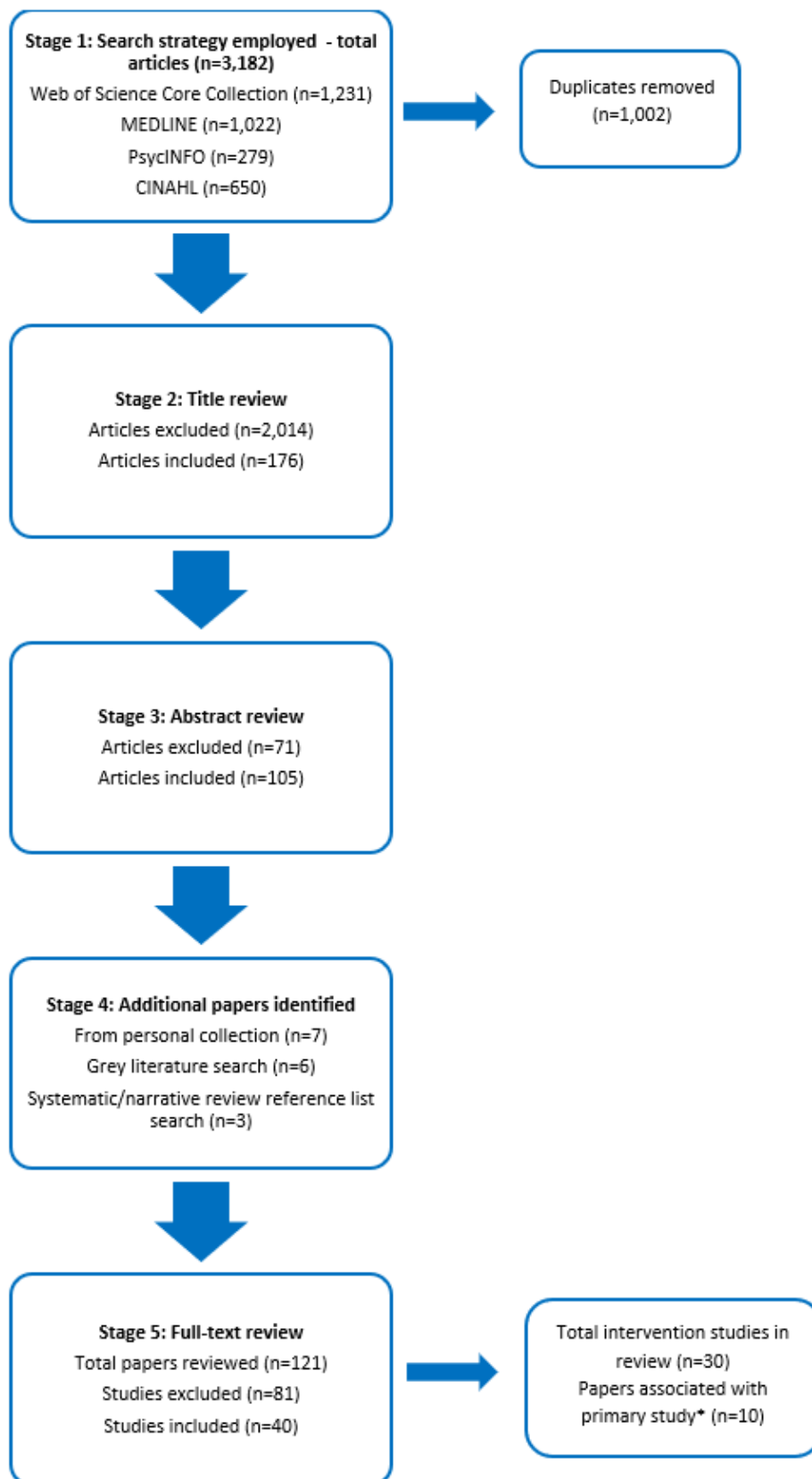
- The setting being outside of the workplace.
- Interventions with the primary aim of increasing physical activity and secondary aim to reduce sedentary behaviour, e.g., studies that evaluated interventions involving activity-permissive workstations (e.g., treadmill or cycle desks).
- Systematic or narrative review methodology.

Interventions with the primary aim of increasing physical activity were excluded because evidence has demonstrated that it is interventions that have targeted sedentary behaviour instead of physical activity that have shown the most promise in terms of behaviour change [109]. Review papers were excluded from the analysis as the aim of this systematic review was to determine effectiveness and key considerations for the development and implementation for individual interventions. Nevertheless, a citation search was undertaken of the reference lists of any review papers identified during the search to ensure potentially relevant papers were not missed.

2.3.4. Study selection

Study selection was initially conducted by the primary researcher. This process involved five stages as outlined in Figure 2.1. To ensure accuracy and consistency of study selection, a 20% random sample of the papers was independently checked by two additional reviewers at the title review stage. Disagreements were resolved by discussion between the reviewers until consensus was reached. Thereafter, the primary researcher determined study eligibility, but for those papers where the decision to include was unclear at the full-text review stage, a second reviewer independently checked papers and again, any disagreements were discussed until consensus was reached.

Figure 2.1: PRISMA flowchart of study selection process



*These included protocol papers, intervention development papers and qualitative papers

2.3.5. Data extraction process

A pre-piloted data extraction tool was developed in Microsoft Excel to ensure consistent and rigorous data collection. For each included study, the primary researcher extracted descriptive data pertaining to: study design, setting (country and organisation type); participant information (sample size and demographic information); intervention description (duration, cost and the intervention development process); outcome data collected and measurement tools used; quantitative and qualitative data (see below for details); and any additional information, such as the use of a theoretical model, co-production during intervention development and whether the intervention was tailored to the needs of the participating organisation(s). To further ensure accuracy and consistency of data extraction, a 10% random sample was coded by an additional reviewer.

Relevant quantitative information, such as: participant numbers; and length, costs (if available) and effectiveness of the intervention in terms of the difference in sitting time (expressed as minutes or hours per day or workday, or percentage of the day) were collected. The overall summary measure for each intervention was the effect size based on the change in sitting time.

Qualitative data relating to barriers, facilitators, mediators and moderators of an intervention and data relating to intervention context were extracted from participant quotes or findings reported by authors that were adequately supported by data from focus group discussions, interviews and surveys (where open question responses were recorded) (i.e., first-order constructs). In addition, author interpretations, statements, assumptions and ideas (i.e., second-order constructs) relating to the development and implementation of the intervention were extracted from both results and discussion sections of the papers. All relevant qualitative data were copied into the data extraction tool. The qualitative data were then exported into a Microsoft Word document for analysis.

2.3.6. Quality assessment tools

As a wide range of study designs were included in this review, the most appropriate tool for each study design was used to assess quality which included:

- Cochrane Risk of Bias Tool [110] for RCTs (including crossover trials and cluster RCTs)
This tool consists of seven quality domains: random sequence generation; allocation concealment; blinding of participants and personnel; blinding of outcome assessment; incomplete outcome data; selective reporting; and other sources of bias. An assessment of whether there was a low-, high- or unclear-risk of bias for each domain was required. An overall summary assessment of the level of risk of bias was then determined, based on which domains were most important in the context of the review. If there was a high-risk of bias in any one of the seven domains, the overall assessment of risk of bias was determined to be high regardless of the other outcomes of the other domains. If the domains were

classified as unclear-risk with no high-risk domains, then the overall assessment was an unclear-risk of bias; if domains were identified as low-risk throughout, then the overall assessment was a low-risk of bias.

- Risk of Bias in Non-Randomised Studies-of Interventions [111] for non-randomised trials
This tool consists of seven domains: bias due to confounding; bias in selection of participants into the study; bias in classification of interventions; bias due to deviations from intended interventions; bias due to missing data; bias in measurement of outcomes; bias in selection of the reported result. An assessment of whether there was a low-, moderate- or serious-risk of bias for each domain was required. The overall assessment of risk of bias was determined to be: serious if at least one domain was identified to have a serious-risk of bias; moderate if low or moderate-risk throughout; low-risk if low throughout; and unclear if there was no clear indication that the study was at serious-risk of bias and there was a lack of information in one or more domain.
- Mixed-Methods Appraisal Tool [112] for mixed-methods studies
This tool consists of three domains, which refer to the methodological quality in the: qualitative component; quantitative component; and mixed-methods component. Qualitative and quantitative components could each gain a maximum quality score of four and the mixed-methods component could gain a maximum score of three. The scores were then combined to give an overall score of quality. However, this overall score could not exceed the quality of the weakest component.
- Critical Appraisal Skills Programme (CASP) Tool [113] for qualitative studies
This tool consists of ten quality questions which relate to the quality of: the research aims; qualitative methodology; research design; recruitment strategy; data collection; whether the relationship between the researcher and participants has been considered; ethical approval; data analysis; reporting of the findings; and the importance of the research. Each question required an answer of “yes”, “no” or “can’t tell”. The determination of an overall “score” is not recommended by CASP; therefore, a descriptive assessment of quality was undertaken for the qualitative studies.
- Quality assessment was not formally undertaken for pre-post intervention studies, as this study design inherently encompasses high levels of bias which cannot be mitigated. Instead, all pre-post intervention studies were categorised as high-risk.

In line with the increasing understanding that qualitative data should be included in systematic reviews [114, 115], all studies were included in the review regardless of quality assessment. This was to allow the inclusion of qualitative data from a range of study designs that would provide a richer understanding of the key considerations important for the development and implementation of interventions to reduce workplace sitting. Instead, an assessment of quality was conducted in order to potentially explain differences in results of otherwise similar studies.

2.3.7. Data synthesis

The data synthesis was conducted in two stages: a narrative synthesis for the descriptive and quantitative data; and a thematic synthesis for qualitative data.

Narrative synthesis

A narrative synthesis was performed as it was not possible to synthesise the quantitative data through meta-analysis due to study heterogeneity (in terms of study design, intervention type and outcome measures used). The primary study findings were assessed and similarities and differences between the studies explored. For the studies where relevant data were available, effect sizes for interventions were calculated. This was achieved using either Morris' formula for estimating effect sizes from pre-test-post-test control group designs [116] or using the meta-analysis calculator for papers where the mean difference only was presented (available at: <http://www.lyonsmorris.com/ma1/>).

The post-intervention data used were presented immediately post-intervention rather than longer-term follow-up data which were available in some papers. Where intervention length was not explicitly reported, the longest follow-up point was used as the post-intervention measure. In papers where two interventions were evaluated against a control group, the effect size for each intervention was calculated. For pre-post intervention studies with no control group, effect sizes were calculated based on the before and after data. Where there were multiple interventions evaluated without a clearly defined control group, a before and after effect size was calculated for each intervention.

As a result of the variance in the presence and type of control group used in these studies, the papers were put into one of three groups: papers which compared an intervention group to a traditional control group, i.e., no/minimal modifications; papers which compared an intervention group to another intervention group but which was clearly defined as the control group for analysis; papers with no control group, i.e., pre-post intervention which did not compare an intervention with a control group or papers where there were multiple intervention groups but none were defined as the control group.

Thematic synthesis

An inductive thematic synthesis of the qualitative data was conducted to identify themes relating to intervention implementation. This synthesis followed the three stages as outlined by Thomas and Harden [114]: coding the text line-by-line, developing descriptive themes, and generating analytical themes. Codes were created inductively to capture the meaning and content of each extracted statement. The coding of the text allowed the translation of concepts from one study to another, but new codes continued to be added with each study that was analysed. Similarities and differences between the codes were then reviewed to allow grouping of the codes into a hierarchical structure where initial descriptive themes were identified. Analytical themes were then determined by "going beyond" the content of the original studies using the descriptive

themes to answer the qualitative review question – namely, what are the key considerations for the development and implementation of interventions to reduce workplace sitting?

2.4. Results

2.4.1. Study characteristics

Study design

Forty papers were included in the review, comprising 30 primary intervention studies [59, 61, 62, 64–68, 85, 86, 88–92, 117–131] and ten papers that were associated with the primary intervention studies. These associated papers included two study protocols [132, 133], two intervention development papers [87, 134], three qualitative papers [135–137], one additional quantitative paper [138], one descriptive paper (describing the translation of an intervention to widescale uptake into practice) [139], and one duplicate publication in an alternative form, i.e., a dissertation report [140] (see Appendix 3, Table 1 for information on which intervention studies these papers related to). These associated papers were reviewed to extract relevant qualitative data that may not have been present in the main intervention evaluation paper.

Of the 30 intervention papers, 17 were RCTs [59, 61, 68, 86, 89–92, 118–120, 122–126, 130], six were non-randomised trials [62, 65, 85, 88, 117, 121], six were pre-post intervention study designs [64, 67, 127–129, 131], and one was a mixed-methods study [66].

Detailed characteristics of the 30 included studies are presented in Appendix 3, Table 1.

Setting

Of the 30 different studies, 13 were set in Australia [59, 61, 62, 66, 85, 86, 88, 91, 117, 120, 124, 127, 129], six in the United States or Canada [68, 89, 121, 123, 126, 128], five in the UK [64, 67, 118, 119, 131], four in mainland Europe [90, 92, 122, 125], and two did not explicitly state the country setting [65, 130]. Fifteen of the studies were conducted either solely [61, 64, 65, 67, 68, 88, 118, 119, 122, 123, 126, 128, 131], or in part [90, 91], within an academic institution. The remaining studies were conducted within a range of public, private and voluntary sector organisations.

Four of the 15 studies conducted in academic settings [61, 67, 91, 119] had commercial links with Ergotron Inc. (www.ergotron.com), which provided the sit-stand desks for all of these studies. Two of these studies explicitly stated that Ergotron had no involvement or influence in the conduct or findings of the research [67, 119]. One of these studies [61] reported that Ergotron Inc. paid expenses for two authors to attend a conference organised by Ergotron, although it was highlighted that no further honoraria or imbursements were received and no conflicts of interest were declared. The final of these four studies reported that

Ergotron Inc. supplied the sit-stand desks, but did not provide any clarification of further involvement, although did declare no conflicting interests [91]. A further study had support from Get Britain Standing (<http://activeworking.com/index>) and Sustrans (www.sustrans.org.uk) although the nature of the involvement was not made clear in this grey literature publication [131]. All the studies conducted in the UK at the point of carrying out the search for this review (January 2017) were within academic settings.

Sample size and participant characteristics

The combined population of the 30 intervention studies included in this review was 2,271 participants, with the total sample size per study ranging from 11 to 317. The majority of the intervention studies had predominantly female participants (ranging from 53% to 100%). Three of the intervention studies had lower proportions of females ranging from 46% [124], 45% [117] and 20% [85]. Nineteen of the 30 studies [59, 61, 62, 64–66, 68, 88, 90–92, 118, 119, 121, 124, 126, 128, 129, 131] had majority participants with tertiary-level education or who were in professional (not administrative) job roles. Of the remaining 11 studies, ten either did not report educational-level/job role or the breakdown of proportion of participants working in specific job roles was unclear [67, 85, 86, 89, 120, 122, 123, 125, 127, 130]. One study [117] had a sample with only 42% participants with tertiary-level education.

Interventions

Intervention duration ranged from one day to 12 months: two studies evaluated interventions which lasted for 12 months [120, 124]; one was six months [65]; one was five months [85]; two were 19 weeks [122, 141]; five were 12 weeks [61, 67, 86, 88, 125, 128]; one was ten weeks [68]; one was eight weeks [119]; six were four weeks [59, 62, 64, 89, 91, 121]; one was ten days [131]; three were one week [118, 123, 127]; and one lasted only one day [130]. Three studies did not clearly document intervention duration [90, 92, 126]. Two natural experiments [66, 129] involved the evaluation of permanent interventions, but measures were taken at three and four months respectively.

The majority of studies evaluated interventions which involved the use of ergonomic interventions such as sit-stand desks or height-adjustable desks, either alone [59, 65, 66, 88, 119] or in combination with other intervention components such as the provision of educational information [67, 91, 92, 117, 127], prompts [89, 92, 117, 125], promotion of other “sit less” initiatives, e.g., walk and talk meetings [86], the use of health coaches/workplace champions [61, 62, 92, 120], individualised feedback [61, 62, 120], or as part of a wider health and wellbeing programme [121]. Other interventions included: automated web-based programmes with a range of support strategies [90, 122]; use of a wrist-worn device to disrupt sedentary behaviour [126]; environmental adaptation via a move to a new purpose-built building [129]; and multicomponent interventions using a variety of low-cost strategies, e.g., leaflets, posters, emails, prompts, workplace champions and management support to encourage staff to reduce workplace sitting [64, 68, 85, 118, 123, 124, 130, 131].

Outcome measures

Twenty-two studies used an objective measure of sitting time via inclinometers (activPAL3) [59, 61, 62, 67, 68, 88, 90, 91, 117, 118, 120, 123, 124, 126, 128], and/or accelerometers (e.g., ActiGraph) [67, 68, 86, 89, 92, 125, 127, 129], or a sitting-pad device [85]. The remaining studies used subjective measures of sitting time, via self-report/questionnaires [64–66, 122, 130, 131], ecological momentary assessment (i.e., using a paper diary to report whether they were sitting, standing or walking every 15 minutes) [119] and experience-sampling methodology (i.e., responding to a text message sent three times per day) [121]. De Cocker et al. [90] used an objective measure of sitting time for a sub-sample (57%), the remaining sample completed a self-report instrument. In addition, Chau et al. [117] used an objective measure of sitting time in the form of activPAL3 and ActiGraph; however, due to low participant adherence to these devices (n=15, 45% of total sample), only the self-report data was reported and analysed, with the objective data being available as supplemental information.

2.4.2. Quality assessment

The quality assessment of studies is shown Appendix 3, Tables 2 to 5. Qualitative studies which were linked to intervention studies but published in a separate paper [135–137], were quality assessed separately using the CASP tool. As described in Section 2.3.6, the included pre-post intervention studies were not quality assessed using a specified tool, but instead categorised as high-risk based on the study design. Therefore, a total of 27 papers underwent formal quality assessment. All RCTs were defined as having a high-risk of bias. This was primarily as a result of lack of blinding of participants which could have resulted in reporting or social desirability biases. However, due to the nature of these types of interventions, it is very difficult to mitigate this, although the use of objective measurement tools can help mitigate recall/reporting biases. Other prominent reasons for the high-risk of bias were the lack of researcher blinding to the allocated interventions and the use of subjective measurement tools resulting in recall or social desirability biases.

For the non-randomised trials, four were determined to be of serious-risk of bias [65, 85, 117, 121], one of moderate-risk of bias [88], and one lacked enough information within one of the domains to allow a full assessment of risk of bias [62]. The main reasons for giving an overall assessment of serious-risk of bias related to the lack of adequate control of confounders, the measurement of outcomes used (as a result of a lack of researcher blinding and the use of subjective measurement tools), and the selection of reported results (due to the presence of multiple outcome measurements within the outcome domain or multiple analyses of the intervention-outcome relationship).

For the mixed-methods study by Grunseit et al. [66], the qualitative component received a score of three-out-of-four and the mixed-methods component received a score of two-out-of-three. However, as the quantitative component received a score of zero, the overall score for paper was therefore also zero. The zero

score for the quantitative component was due to the sample not being representative of the population under study, the lack of an objective measure of sitting time, and a poor response rate.

The CASP tool, used to determine quality of the qualitative studies, does not recommend the calculation of an overall score of quality, so a more narrative assessment of quality is required. The study by Dutta et al. [136] did not pass the screening questions as the aim of the research was not reported. Further, there were multiple quality issues highlighted with the paper including: a lack of use of direct quotes to support findings; the use of quantitative data to present qualitative findings; and an unclear purpose of conducting both focus groups and interviews which addressed the same issues and reported similar findings. Therefore, a more formal assessment of quality was not undertaken, instead it was categorised as a low-quality study. The other two qualitative papers [135, 137] passed the initial screening questions, but failed to explicitly state how the relationship between the researchers and the participants was considered. Furthermore, Leavy et al. [137] did not provide a clear statement of findings as there was little discussion of research that contradicted the findings, but supportive research was identified.

2.4.3. Quantitative narrative synthesis

The intervention effects in terms of a reduction in sitting time are presented in Appendix 3, Table 1. Due to study heterogeneity, a meta-analysis was not appropriate. Included studies presented data using a variety of different units of measurement including: sitting time in minutes or hours per workday; minutes or hours per working week; total daily sitting time; or proportions of time spent sitting during the day expressed as percentages. Furthermore, as study designs included in this review varied, some data were reported as within-group and some as between-group differences in sitting time.

Of the 30 studies, 23 reported a statistically significant reduction in sitting time: either as a result of within-group differences [66, 67, 86, 117, 121, 124, 126, 129, 130]; or between-group differences [65, 68, 88–92, 123, 128]; or both [59, 61, 62, 120, 122], for at least one follow-up point. Statistical significance was determined by the reporting of p values <0.05 or 95% CI that did not cross the point of no effect. However, as statistical significance is determined by sample size and a range of sample sizes were used in the included studies, it was more meaningful to compare effect sizes of the different interventions.

It was possible to calculate effect sizes (Cohen's d) for all except four of the 30 included intervention studies [59, 86, 89, 121]. The corresponding authors of these four papers were contacted to request the required data. However, no additional information was received so effect sizes are not available for these papers. Three of the included papers had multiple effect sizes calculated due to the evaluation of more than one intervention: DeCocker et al. [90] evaluated both a tailored and generic intervention against a control group that received no intervention; Neuhaus et al. [61] evaluated both a multicomponent and workstation only intervention against a control group that received no intervention; and Priebe et al. [130] evaluated four

different styles of email messages, which were not compared to a clearly defined control condition; instead, pre- and post-intervention data were presented.

The effect sizes calculated from these papers ranged from 0.008 to 2.770. Cohen defined effect sizes as small if $d = 0.2$, medium if $d = 0.5$, and large if $d = 0.8$ [142]. Effect sizes of <0.2 are interpreted as having a trivial difference between the two groups, even if this difference has been determined to have statistical significance [142]. Based on this interpretation, 13 papers evaluated a total of 14 interventions which demonstrated large effect sizes [61, 62, 66, 88, 90–92, 117, 119, 120, 126, 129, 131]; two papers demonstrated two interventions with medium effect sizes [65, 130]; seven papers evaluated nine interventions with small effect sizes [64, 67, 85, 90, 118, 128, 130]; and six papers demonstrated six interventions with effect sizes of <0.2 [68, 122–125, 127].

The papers were grouped depending on the presence and type of control group (see Appendix 3, Table 1 for details). Sixteen of the 30 studies were identified as having a control group, which received either no modifications or only very minimal modifications, such as receiving a brief educational session or general health and wellbeing advice. Five studies compared two intervention groups, but where one of the intervention groups was identified as the control group, e.g., receiving sit-stand desks, but without prompts or associated educational information. Nine studies either did not report the use of a control group at all or evaluated multiple interventions without clearly defining which was the control condition. Of the papers demonstrating interventions with large effect sizes: eight compared the intervention effects with a traditional control group condition [61, 62, 88, 90, 91, 117, 119, 120]; two compared the intervention with another intervention group which was identified as the control condition [92, 126]; and three were pre-post intervention studies and did not include a control group [66, 129, 131].

Of the 14 interventions with large effect sizes, ten included sit-stand desks, either as a stand-alone intervention [61, 66, 88, 117, 119] or as part of a multicomponent intervention [61, 62, 91, 92, 120]. The remaining four interventions comprised: a web-based intervention which provided personalised advice [90]; a wrist-worn prompt to disrupt 60 continuous minutes of sedentary behaviour [126]; large-scale environmental move to a new purpose-built office which was designed to be activity-permissive [129]; and a multicomponent intervention including a range of strategies identified by the employees to reduce sitting such as email reminders and distributing posters and leaflets and the intervention was linked in with a national campaign [131]. Seven other papers also evaluated sit-stand desk interventions, one demonstrated a medium effect size [65], one a small effect size [67], two demonstrated effect sizes <0.2 [125, 127], and three did not present all relevant data required for calculation of effect size [89, 121, 135].

Seven of the 13 papers that demonstrated interventions with large effect sizes were set in academic institutions [61, 88, 90, 91, 119, 126, 131]; which equated to half of all papers set within an academic institution. Nine of these 13 papers used an objective outcome measure to determine changes in sitting time,

e.g., activPAL or ActiGraph [61, 62, 88, 90–92, 120, 126, 129]; which was over a third of all papers reporting the use of an objective measure. Five of these papers explicitly reported the use of a behaviour change theory during intervention development and/or implementation [61, 90, 92, 120, 131]; which was over half of all the papers that reported the use of a theoretical approach. In addition, five of these papers reported some form of participatory approach during intervention development [61, 62, 92, 117, 120]; which again was over half of all the papers reporting the use of staff participation.

2.4.4. Qualitative thematic synthesis

Qualitative data relating to the key considerations important for intervention development and implementation were extracted from 34 of the 40 papers. The majority of the qualitative data extracted came from second-order constructs (author interpretations, statements, assumptions and ideas) from the following papers which were associated with a primary study: three qualitative papers [135–137], one intervention development paper [87], one descriptive paper (describing the translation of an intervention to widescale uptake into practice) [139], one mixed-methods paper [66], and one dissertation report [131]. Other papers provided smaller amounts of useful qualitative data [59, 61, 62, 64, 67, 68, 85, 86, 89, 90, 92, 117, 119–125, 127–130, 133, 134, 138, 140].

Descriptive and analytic themes

The thematic synthesis coding process created 40 initial codes, from which emerged nine descriptive themes. Three higher-order analytic themes were then derived from these nine descriptive themes. Some descriptive themes were found to cut across several analytical domains (see Table 2.2).

The nine descriptive themes, phrased as key considerations, included the need to: (i) understand potential local barriers and facilitators to participation and implementation; (ii) identify and use a theoretical model to operationalise intervention strategies; (iii) use participatory or collaborative approaches during intervention development and implementation; (iv) conduct a feasibility or pilot study within the target organisation; (v) develop an action plan incorporating key intervention characteristics; (vi) embed the intervention within local policy or gain high-level management support; (vii) conduct a comprehensive process evaluation; (viii) conduct an outcome evaluation using a range of measures; and (ix) take into account and report details of the real-world context to support knowledge translation, intervention generalisability and the potential for scaling-up the intervention. The three higher-order analytical themes inferred by the qualitative data were determined to be the key considerations relating to intervention development, implementation, and evaluation.

Table 2.2 Descriptive and analytic themes

| Descriptive Themes | Analytic Themes | | |
|---|--------------------------|-----------------------------|-------------------------|
| | Intervention Development | Intervention Implementation | Intervention Evaluation |
| Understanding local barriers and facilitators to participation | X | | |
| Identifying and using a theoretical model to operationalise intervention strategies | X | | |
| Using participatory or collaborative approaches | X | X | |
| Conducting a feasibility or pilot study within the target organisation | X | X | |
| Developing and implementing an action plan incorporating key intervention characteristics | X | X | |
| Embedding the intervention within local policy or gaining high-level management | | X | |
| Conducting a comprehensive process evaluation | | | X |
| Conducting an outcome evaluation involving a range of measures | | | X |
| Taking into account the real-world context | X | X | X |

Understanding local barriers and facilitators to participation

Findings highlighted the importance of identifying and understanding local barriers and facilitators to intervention participation during the development phase. Individual-level barriers to interventions included: individual preference for a seated working style [66, 135, 140]; feelings of self-consciousness when standing due to the perception of being a distraction to seated colleagues [119, 131, 134, 135, 137]; the perception from staff and/or managers that sitting less initiatives could negatively impact on productivity [66, 131, 134, 135]; and work-related factors such as the nature of work, workload and time [64, 119, 131, 134, 135]. The idea that sitting in the workplace represents a social norm [131, 135] and the issue of the physical work environment providing limited opportunities to sit less [64, 66, 124, 125, 131] were identified as further barriers. Some papers noted cost as a potential barrier to large scale roll-out, given the high upfront costs for interventions that included sit-stand desks [59, 66, 117, 137] or larger-scale environmental changes [128]. Several facilitators to sitting less were also highlighted including: perceived benefits to physical health, stress

levels and productivity [66, 135]; and perceptions of peer [66, 119, 131, 137] and/or management support [59, 62, 68, 117, 119–121, 123].

Identifying and using a theoretical model to operationalise intervention strategies

Identifying and using one or more theory or model of behaviour change was found to be an important step during the development of intervention strategies. Nine studies reported the use of theory to inform intervention design. Single theories were used in four studies including: Social Ecological Model (SEM) [64, 132], focus theory [130], and Social Cognitive Theory (SCT) [68]. Combined theories were reported in five studies: SCT, Rogers' Diffusion on Innovations Theory and Goal-Setting Theory [92]; SCT and SEM [61, 120]; Theory of Planned Behaviour (TPB), with supporting concepts from both Self-Regulation Theory and Self-Determination Theory [90]; and the COM-B model (Capability, Opportunity and Motivation behaviour change model, using the Behaviour Change Wheel and Theoretical Domains Framework) and TPB [131]. The use of theory ranged widely from: a simple mention of a theoretical model [124]; to describing the use of theory to support the development of interventions [61, 120]; to using theory to support intervention development and identify specific theoretical constructs and how these were operationalised [64, 90, 134]; and finally to using theory to support intervention development, implementation and process evaluation [68, 92, 130, 131]. Grounding intervention development within one or more theoretical models was believed by some of the authors of the included studies and/or associated papers, to enhance intervention effectiveness [64, 68, 87, 90, 92, 130].

Using participatory or collaborative approaches

It was reported that employee participation with development and implementation ensured that the intervention: was acceptable and feasible for employees [64]; supported engagement, tailoring and commitment for the intervention [86]; and highlighted and proposed ways to overcome anticipated barriers to intervention implementation [134]. Ten of the papers explicitly reported or recommended the use of participatory approaches during intervention development and/or implementation. Eight of these studies reported or recommended participation either via top-down involvement of team leaders/management [117], or bottom-up discussions with workplace champions [124] and/or groups of employees [62, 64, 85, 86, 92, 139] as part of workshops, focus groups, a workplace wellbeing committee, and information and consultation sessions. Two papers [87, 135] reported the use of collaborative approaches where both managers and employees were involved in intervention implementation.

Conducting a feasibility or pilot study within the target organisation

Three of the studies in this review were feasibility studies [61, 62, 64], acting as precursors to larger future trials. Two other papers described the use of feasibility or pilot testing as part of the intervention development and/or implementation [87, 92]. The latter two papers reported benefits of feasibility and pilot

testing including: establishing what facilities were available in the workplace; understanding routines, interactions between employees and meeting frequencies; determining intervention efficacy, acceptability and feasibility; and allowing time for testing the implementation of the various intervention components. This information provided an opportunity to refine the intervention based on feedback from participants. Conducting a feasibility or pilot study within the organisation of interest therefore was anticipated to maximise the effectiveness of the intervention.

Developing and implementing an action plan incorporating key intervention characteristics

Developing and implementing an action plan [139] which incorporated a range of key intervention characteristics was an important finding. Key characteristics that were identified included:

- Tailoring an intervention to ensure that it met the needs of individuals and/or the organisation and was relevant to different groups of employees within an organisation [61, 86, 122, 125]. Tailoring could be supported by the use of theoretical models [61, 134] and a participatory approach to intervention development [64, 85, 86, 120].
- Having a menu of strategies provided more choice for both employees and employers [135], and could be developed using participatory approaches tailored to specific organisational contexts [85].
- Using multicomponent interventions to target multiple levels of influence, i.e., at the individual-, social-, organisational- and environmental-level, was characteristic [61, 62, 64, 85, 92, 120, 125] and reported to have the potential for a more comprehensive and sustained change on workplace sitting time compared to single-level interventions [68, 85, 87, 121, 128].
- Involving workplace champions in the development and/or implementation of an intervention was found to be a beneficial strategy [62, 64, 87, 120, 124]. Workplace champions were reported to promote intervention messages and create a supportive culture within the organisation to aid change [139] or be agents of change, to advocate for the allocation of resources and influence organisational policy targeting workplace sitting [137].
- Ensuring interventions were low-cost, which reflects the finding described above relating to cost being a barrier to intervention uptake [59, 61, 117, 135, 137].
- Considering interrupting versus replacing sitting time, as one study found that interrupting workplace sitting could be more feasible than replacing longer periods of sitting with standing [134].

Embedding the intervention within local policy or within high-level management

For effective intervention implementation and organisational change, some studies reported ensuring that the intervention was supported by management and aligned with the target organisation's policies and/or strategies. This was achieved using one or more of the following initiatives: engaging management and gaining their commitment for the intervention [62, 64, 87, 117, 133, 135]; identifying and understanding an

organisation's priorities or image by obtaining a clear description of the organisation's processes and structures that could relate to intervention implementation [117, 135]; and where possible, embedding the intervention within the organisation's processes, structures, policies and/or strategies [62, 86, 87, 125, 128].

Methods for engaging management reported by studies in this review were wide-ranging and included: managers being responsible for explicitly promoting the intervention [135]; using managers from relevant departments to facilitate the logistics of implementing an intervention, e.g., a risk manager monitored the planning and implementation, and a health and wellness manager co-ordinated all parties and arranged for the researchers to gain access to required local data [117]; presenting a business case to managers and gaining formalised commitment to the intervention [137, 139]; asking managers to distribute emails relating to the intervention [62, 64, 85]; and gaining managers' consent for their staff to participate in the intervention [61, 62, 119, 120]. Consultation with managers also allowed the identification of organisational processes and structures that could be important in terms of intervention implementation [87]. These included information and potential changes in: job design, the physical work environment, workplace social norms, or workplace culture [62]. However, one study identified difficulties in changing organisational culture and suggested the need for stronger external support, such as the use of guidelines, as a way to support this change [86].

Conducting a comprehensive process evaluation

No studies explicitly mentioned the use of process evaluation, but it was undertaken to some degree by seven studies [61, 64, 92, 120, 124, 131, 135]. Process evaluation either encompassed an assessment of intervention feasibility and acceptability and/or a determination of intervention fidelity. Feasibility and acceptability was generally assessed using qualitative methods, e.g., focus groups [61, 64, 131]. Intervention fidelity used quantitative measures, e.g., surveys, aiming to establish: the "dose" of intervention delivered and whether it was implemented as planned; the "dose" that was received; and whether there were any harms or unintended consequences associated with the intervention [61, 92, 120, 124]. In addition, three studies explored the mechanisms of change by considering personal and organisational motivations, which led to initial and continued participation in the interventions [66, 135, 137]. Examples of these motivations included: curiosity to try something new; interest in potential health benefits and/or experiencing changes in health outcomes; perceived improvements in productivity and energy levels; personal challenge; relevance to employees' organisation's priorities; developing task- and time-based routines, e.g., certain tasks were easier to undertake whilst not sitting and time acted as a trigger/prompt to sit less; and an awareness of the issues associated with prolonged sitting at work, which led to a shift in the perspectives of peers or managers and/or a change in organisational culture, providing employees with informal "permission" to sit less at work.

Relatedly, none of the included studies formally reported on intervention adherence. However, there was some discussion of intervention adherence or participant engagement with the intervention in four of the included studies [85, 117, 126, 133]. Three of these studies highlighted strategies to enhance intervention

adherence and/or engagement in the discussion section of the papers, which included providing technology-based, real time feedback [85], having an initial face-to-face visit with subsequent telephone and email reminders at follow-up [117], and passive prompting (e.g., hourly prompts using computer software to remind participants to get up and move) [126]. Finally, one study protocol paper stated that the plan was to assess intervention adherence via interviews with participants as part of the process evaluation, but these findings have yet to be published [133].

Conducting an outcome evaluation involving a range of measures

Measuring sitting/standing/moving time both within and outside of the workplace was believed to be important for intervention evaluation due to the possibility of a compensation effect, e.g., a reduction in sitting time at work resulting in an increase in sitting time at home [67, 140]. Addressing wider-reaching outcomes was undertaken by some studies in this review to support a greater understanding of additional impacts of workplace sitting interventions. These included: the impact on physical (primarily musculoskeletal) [64, 121, 131, 135–137] and mental health and wellbeing [64, 131, 137]; work-related factors such as changes to productivity, alertness and concentration [64, 68, 119, 131, 135–137, 140]; staff morale and autonomy with feelings of empowerment to change workplace sitting behaviour [135, 137]; and wider socio-environmental changes or shifts in organisational culture [62, 64, 119, 131, 135, 136]. Finally, including a measure of intervention cost in order to allow an assessment of return on investment, which balances costs with potential productivity trade-offs, was found to be a potential facilitator to intervention uptake and therefore an important outcome to evaluate [117]. However, none of the studies reported formal cost-effectiveness data. Four papers briefly reported the costs for a single sit-stand desk as US\$400-900 [89], £360-375 [119], US\$400 [62], US\$499 [61]. Eight papers identified that the intervention was “low-cost” [64, 120, 122, 130, 131], “a low resource intensive intervention” [124] or less expensive than more resource intensive individual-level interventions [92, 125], without presenting any quantitative cost data.

Taking into account the real-world context

There was a paucity of contextual information reported in the included studies. Most of the studies presented information on the type of organisation(s) participating in the study and the sector within which that organisation was based. Only a few studies reported additional contextual factors such as information of different occupational roles or tasks [85, 86, 92], the organisation’s prior interest/involvement in workplace health initiatives [121, 124], local organisation processes [86], and the physical work environment [92, 140]. In general, this contextual information was only briefly described. Two papers provided some in-depth contextual information relating to the varying job roles, local organisation processes and expectations of employees [86], and the physical environments of participating workplaces [140]. However, no study explicitly included information on the organisational culture, and the wider political and economic landscape.

Therefore, it was not possible to gain a clear picture of the contexts within which the interventions were developed, implemented and evaluated.

2.4.5. Integrative analysis

Of the studies which were found to have a large effect size in the quantitative analysis, most of them reported the use of one or more of the key considerations identified in the qualitative analysis above that were important for developing, implementing and evaluating interventions to reduce workplace sitting time:

- Chau et al. [117] reported the use of strong engagement with upper level management during all aspects of intervention planning, implementation and development.
- DeCocker et al. [90] used behaviour change theory during intervention development and found that the intervention that was tailored to individual participants was more effective than a generic, non-personalised intervention.
- Graves et al. [119] gained management support and also explored a range of outcome measures including an assessment of intervention feasibility and acceptability, which found that the social environment, particularly the presence and actions of others, impacted participants' engagement with the intervention.
- Healy et al. [62] used organisational-level strategies and a liaison person within the organisation to support intervention implementation with the aim of demonstrating workplace culture change. Brainstorming strategies were also used with staff representatives so that the intervention was tailored to their needs. A more recent paper by Healy et al. [120] used behaviour change and social ecological theories for intervention development and also used intervention tailoring, flexibility and participatory approaches with the specified aim of scaling-up the intervention.
- Neuhaus et al. [61] used behaviour change and social ecological theories, individual-level tailoring, management support and organisational strategies as part of the multicomponent intervention development and implementation.
- Leavy et al. [137] conducted a qualitative evaluation of an intervention and identified alternative outcomes associated with an intervention to reduce sitting time, such as enhanced health and wellbeing, engagement with work, the opportunity and flexibility to move more in the office, employee morale and injury prevention and management.
- Danquah et al. [92] explored the effectiveness of an intervention, which involved management support and workplace ambassadors, and undertook a form of process evaluation in terms of "dose" of intervention delivered and received and any harms that occurred. Danquah et al. [92] also used intervention mapping and behaviour change theories to develop the multicomponent intervention and piloted this intervention in a test office prior to conducting the larger trial.
- Grunseit et al. [66] explored some wider outcome measures in the form of a qualitative analysis, which identified physical health changes and impacts on productivity and energy levels.

- Jancey et al. [129] provided a detailed description of the environment within which the intervention was implemented.
- Richards and Brain [131] used behaviour change theory during intervention development; barriers and facilitators were explored prior to intervention implementation and also post-intervention. Management support was obtained.

Many of the studies with large effect sizes were associated with one or more of the key considerations identified in the qualitative analysis as important during intervention development, implementation and evaluation. However, there were other studies that also incorporated some of these considerations, but were found to have a smaller effect size. For example, Gilson et al. [85] used ideas of management support, a participatory approach and some individual-level tailoring and Mackenzie et al. [64] also obtained management support, developed the intervention using participatory measures and explored wider outcome measures including the feasibility and acceptability of the intervention. Therefore, the consideration of factors that could be important when developing, implementing and evaluating interventions to reduce workplace sitting time does not necessarily translate into large effect sizes. Furthermore, it is not yet clear which of these factors could have the most impact in supporting staff to sit less at work.

2.4.6. Intervention framework development

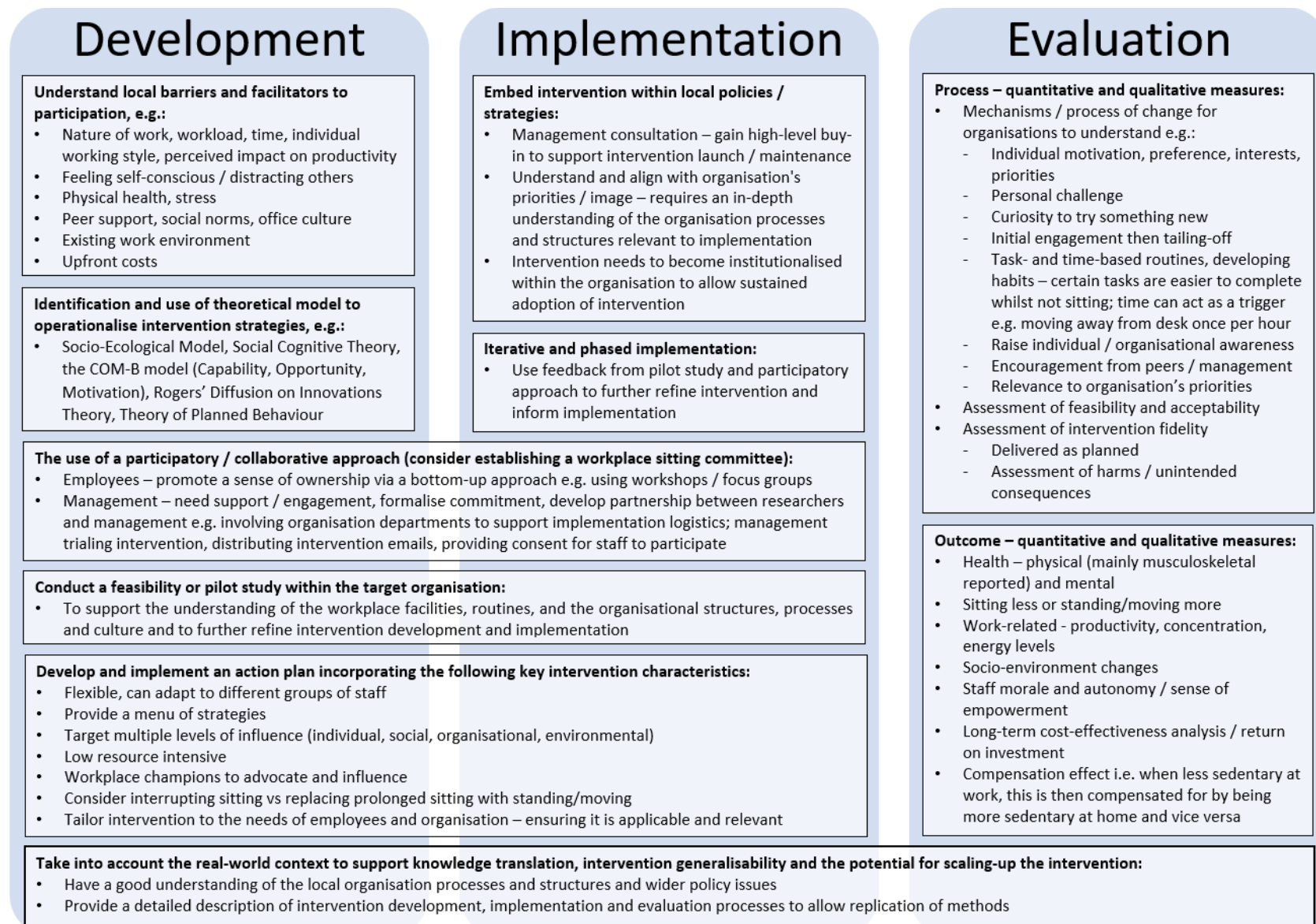
The findings presented in this review have highlighted a wide variety of interventions and associated effect sizes. It is clear that a “one size fits all” approach, in terms of intervention content, is neither efficacious nor feasible. Furthermore, the qualitative thematic synthesis has produced some interesting findings which could improve the effectiveness and external validity of future sit less at work interventions. As such, the findings from the qualitative thematic synthesis were translated into an operational framework (see Figure 2.2). Once tested and refined, this operational framework could provide an actionable tool to guide the future development, implementation and evaluation of interventions to reduce workplace sitting time.

The framework’s structure was guided by the qualitative findings. This framework displays the higher-order analytical themes, determined from the qualitative synthesis, within three large boxes labelled as *development*, *implementation* and *evaluation* (see Figure 2.2). The associated lower-order descriptive themes were translated into strategies which would either help to overcome identified barriers or incorporate elements of good practice. The framework takes into account the descriptive themes that cut across one or more of the higher order themes, demonstrated with the smaller boxes that stretch across more than one of the three larger boxes (see Figure 2.2).

According to this framework (see Figure 2.2), when considering the *development* of interventions to reduce sitting in the workplace, there needs to be engagement with employees and managers to understand local barriers and enablers to sitting less at work. Furthermore, a suitable theoretical model to support the

operationalisation of possible intervention strategies needs to be identified and utilised during intervention development. The framework then provides suggested strategies to adopt during both the *development* and *implementation* of interventions. These include: using a participatory or collaborative approach to intervention development and implementation; conducting a feasibility or pilot study within the target organisation to ensure any additional barriers can be identified and overcome prior to a wider scale roll-out; and developing and implementing an action plan. The action plan should: be tailored to the specific context; have a menu of strategies; target multiple levels of influence (i.e., individual-, social-, organisational- and environmental-levels); incorporate workplace champions if appropriate; be low-cost; and consider strategies to both interrupt and replace long periods of sitting. In addition, the intervention *implementation* process should ensure that the intervention is supported by management and embedded into the local organisation's existing policies/strategies. The operational framework also recommends a comprehensive *evaluation* which includes a mixed-methods assessment of both process and outcomes. Finally, underpinning the entire process, is the explicit consideration of real-world contextual factors. This includes developing a clear understanding of the local organisation's processes and structures, and any relevant wider policy issues (e.g., the current economic climate and impact this could be having on staff turnover/morale/job security).

Figure 2.2: Sit less at work intervention development, implementation and evaluation operational framework



2.5. Discussion

The integrative systematic review had three main aims. The first aim was to determine which interventions were effective at reducing workplace sitting time. This review has demonstrated that intervention effectiveness is extremely varied. Sit-stand desks used either alone or as part of a multicomponent intervention appear, in the short-term, to demonstrate some degree of effectiveness. However, these results must be interpreted with a degree of caution due to the likely presence of publication and evidence-related biases as well as the inclusion of studies in this synthesis with high- or serious-risks of bias.

The second aim was to identify key considerations for the development and implementation of interventions to reduce workplace sitting time. The qualitative evidence synthesis has achieved this and has also identified important considerations for the evaluations of such interventions. These findings were used to develop an operational framework, which was the third aim of the review. This operational framework could be used by researchers and practitioners alike when planning interventions.

2.5.1. Quantitative findings – intervention effectiveness and key study characteristics

It was not possible to conduct a meta-analysis because of the heterogeneity of study designs included in this systematic review. Instead, effect sizes for studies were calculated (where possible) to provide an overall summary measure of effectiveness and then a narrative synthesis was undertaken. The calculated effect sizes were extremely wide-ranging, demonstrating a spectrum from trivial differences to large effect sizes. Of the 28 papers where effect size(s) could be calculated, 14 demonstrated large effect sizes in terms of a reduction in workplace sitting time. Not much can be drawn from the studies in terms of the most effective intervention elements, although the majority of the interventions which demonstrated large effect sizes did include a sit-stand desk either alone or as part of a complex intervention. This could be due to the fact that the use of sit-stand desks targets a reduction in sitting time by allowing common workplace sitting activities (e.g., computer-based work) to be more easily replaced by standing, whereas “activity-permissive” environments are aiming for a reduction in sitting by encouraging an increase in physical activity (i.e., moving more), which could be more difficult to achieve with the majority of typical office-based workplace activities.

An RCT study design, the study setting being within an academic institution and the use of objective measures of sitting time all were associated with larger effect sizes in terms of changes in sitting time. These findings could be as a result of publication or evidence-related biases, i.e., those studies more likely to be published are those with more robust study designs and outcome measures and reporting a statistically significant result, and most of those studies focused on sit-stand desks as the chosen intervention. In addition, no studies were excluded from this review based on quality, as the aim of this review was not only to determine which interventions were effective, but to also identify key considerations for intervention development and implementation. However, the majority of studies included in this review demonstrated high- or serious-risks

of bias and the direction of bias would be most likely be to over-estimate the effect sizes due to selection bias and study design.

A consensus statement from Public Health England [143] recommended that office-based workers should aim to reduce the amount of time spent sitting in the workplace by initially replacing it with two hours per day of standing or light activity and gradually increasing this to four hours per day. In practical terms, such a reduction would be very difficult to achieve without the use of environmental-level strategies, such as the installation of sit-stand desks. However, implementing such changes in many workplaces might be difficult to achieve. Sit-stand desks and similar ergonomic equipment or environmental-level changes can be associated with high upfront costs or an unknown return on investment, so are unlikely to be taken-up by many employers in practice. This may be particularly true for small businesses that lack the advantages of scalability and infrastructure possessed by larger employers [144]. It has been suggested that these initial costs could be attenuated, as reducing workplace sitting time may result in longer-term savings both to employers due to reduced sickness and increased productivity [62, 145], and to the wider economy, due to savings associated with healthcare costs. As reported in Chapter 1, the estimated direct health costs of prolonged sedentary behaviour (defined as ≥ 6 hours per day) to the NHS in the UK was £0.7 billion in the financial year 2016-17 [34].

The National Institute for Health and Care Excellence (NICE) has identified physical activity interventions in the workplace, which demonstrate a modest uptake, to be cost-saving for employers due to the reductions in absenteeism [146]. However, it is unclear how this would translate to interventions that aim to reduce workplace sitting. None of the studies included in this review reported formal cost-effectiveness or potential cost-savings data for employers. Due to the concerns associated with more costly interventions, a recent Cochrane review [77] has recommended that future research focus on lower-cost multicomponent interventions, which include elements such as the use of standing meetings, posters or prompts for standing, printers or dust-bins placed further from desks. The current review has not been able to determine effectiveness of these comparatively lower-cost interventions, as there was too much variability in terms of the components used and study design. However, if organisations are more inclined to implement interventions based on the lower initial costs, then there is at least a potential for a greater public health impact. Further research into the effectiveness of interventions with lower associated costs and their potential cost-savings and return of investment for employers is therefore warranted.

The studies included in this review were mainly RCTs and used objective measurement tools (predominantly activPAL inclinometers). This represents an improvement in study design compared to previous reviews [74, 77]. The participants of the included studies were mainly well-educated females, which could limit the generalisability of the findings. This could be due to the most common setting for these studies being within academic institutions, which employ large numbers of tertiary educated staff and because physical activity interventions tend to attract mainly female participants [147]. In fact, at the time of performing the search for

Page | 55

this review (January 2017), all intervention studies conducted in the UK were in academic settings. Staff working in academic institutions are unlikely to be representative of the general working populations, not only due to higher educational attainment levels, but also due to the potential for inherent biases to participate in research and to fully engage with an intervention. Future research should therefore consider adopting recruitment strategies that provide more representative samples of the working population and should seek to develop and evaluate workplace sitting interventions outside of academic institutions. It is noteworthy that since completing this review, two studies have been carried out in the UK in alternative settings: one within the NHS [148] and the other within two not-for-profit office-based organisations [149]. Both of these more recent studies evaluated multicomponent interventions, which included the use of sit-stand desks and, in line with other studies which utilised sit-stand desks, they both reported statistically significant decreases in workplace sitting time.

2.5.2. Qualitative findings for the development and implementation of interventions and the development of an evidence-based framework

Based on the qualitative evidence synthesis, three higher-order themes relating to the *development, implementation* and *evaluation* of “sit less” interventions, and nine associated lower-order descriptive themes emerged. Many of the lower-order descriptive themes align with strategies identified by the MRC for the development and evaluation of complex interventions [84]. For example, exploring barriers and facilitators to intervention development, involving stakeholders/users during intervention development and implementation, conducting a pilot or feasibility study, undertaking a thorough process and outcome evaluation and developing an understanding of relevant contextual factors [84]. It is noteworthy that none of the studies included in this review formally assessed or reported on adherence to intervention strategies. Due to the multicomponent nature of many of the included interventions, researchers may wish to consider mixed-methods (e.g., a combination of focus groups/interviews, questionnaires) to fully assess intervention adherence in future evaluations of interventions.

MRC guidance also recommends the use of a theory-driven approach during the development of complex behaviour change interventions [84]. However, this review highlighted the general lack of use, or detailed reporting of, a theoretical underpinning during intervention development, with only nine of the studies reviewed addressing theoretical constructs. Further, these studies used a range of theories with no single theory appearing dominant, although it is notable that the theories largely drew from the psychological and behavioural sciences. The socially situated nature of sedentary behaviour also provides an opportunity for the use of more sociological or organisational cultural approaches [150]. Despite the appearance of descriptive themes consistent with MRC guidance, they were only reported by a minority of studies.

The findings from the thematic synthesis were then translated into an operational framework, which could help to facilitate a more structured approach to developing, implementing and evaluating workplace sitting

interventions and ensure consideration is given to all of the nine descriptive themes. This framework not only summarises the findings of the thematic synthesis, but also represents an original contribution to the knowledge base, which now requires testing in order to refine and build on this initial version. It is this testing and refinement which will form the basis for the rest of this thesis.

It is possible that there could be themes missing from this analysis and the operational framework. This was demonstrated by the under-reporting of contextual and process-oriented factors. Contextual factors which could be important include details of local organisation processes and structures e.g., size of organisation, sector, hierarchical structure and organisational culture, as well as the wider political and economic landscape [150]. Interventions must align with organisational priorities by demonstrating that there is at least no negative impact on staff productivity. Previous qualitative evidence suggests that interventions to reduce workplace sitting could in fact have the potential to increase productivity by improving concentration, alertness and energy levels [66, 135, 136], which is why it is important to assess these factors as part of an outcome evaluation. A recent paper looking at the social ecological correlates of objectively measured workplace sedentary behaviour found that there were work-specific individual, cultural, environmental and organisational factors associated with sedentary behaviours and that these associations vary by job type and sector [151]. Details relating to local policy, the wider political landscape, economic issues, the physical environment, and organisational culture, would make it possible to understand and evaluate how the intervention effects could be impacted by one, or a combination, of these contextual factors [152, 153]. It is possible that workplace contextual factors were considered during intervention development and implementation, but simply not reported in some studies. Having a detailed understanding of the context will support effective intervention implementation, a pre-requisite for effectiveness [153] and, if comprehensively reported, will aid knowledge translation into real-world settings.

It is difficult to assess whether those studies that incorporated more of the elements laid out in the framework were associated with a larger effect size due to the shortcomings of both the quantitative, i.e., that all study designs were included regardless of the outcome of the quality assessment, and the qualitative, i.e., limited to reported data only, analyses. However, most of the studies that demonstrated large effect sizes in terms of a reduction in sitting time reported the use of one or more of the considerations identified by the qualitative analysis to be important for the development, implementation and evaluation of interventions. This suggests that it is not simply the intervention content that is important, but rather the process of developing, implementing and evaluating such interventions that determines their success, all of which is underpinned by the context of the setting. Nevertheless, there were intervention studies with smaller effect sizes that also incorporated one or more of the framework elements, so it was not possible to assess if their use resulted in effective interventions. Therefore, the framework developed as a result of this review should be thought of as a prompt to ensure that the key considerations for intervention development, implementation and evaluation are explicitly addressed and reported.

2.5.3. Strengths and limitations of the review

The current integrative review has a number of strengths. First, to the best knowledge of the primary researcher, this review is the first to undertake a quantitative and qualitative assessment of interventions to reduce workplace sitting, the latter having been specifically recommended by a recent Cochrane review [77]. Second, due to the need to obtain rich qualitative data, a wide range of studies were included, allowing a broad understanding of key considerations relating to the development, implementation and evaluation of interventions aimed at reducing workplace sitting time. Third, the qualitative evidence synthesis provided the basis for the development of an evidence-based operational framework, which, after a period of testing and refinement, could be translated into a practical toolkit for use by a range of organisations, thereby supporting knowledge mobilisation into real-world settings.

The review findings should also be considered in the context of several limitations. First, the search was limited to only four databases and, as a result, some studies could have been missed. Second, articles were limited to those published in English, which could have resulted in relevant articles published in other languages being missed. However, to ensure all relevant papers were identified, the primary researcher conducted a citation search of all systematic reviews that synthesised intervention studies with similar inclusion/exclusion criteria. The citation search did not identify any non-English intervention studies. Third, the quantitative synthesis was limited to a narrative synthesis only. A meta-analysis was not employed to determine the quantitative impact of interventions to reduce workplace sitting time due to study design heterogeneity. Fourth, the qualitative evidence synthesis and subsequent framework development is limited to the qualitative data reported in the published papers. There were papers where no qualitative data were extracted due to a lack of reporting of considerations relating to the development and implementation of interventions. It is likely that there were insights from these studies that could have been used to further inform the framework. Future research should aim to provide more detailed reporting of the key considerations relating to intervention development, implementation and evaluation.

2.6. Conclusions

This review was the first to conduct both quantitative and qualitative synthesis of studies and associated papers that had evaluated interventions to reduce workplace sitting time. Although a meta-analysis was not feasible, effect sizes were calculated for individual studies. The quantitative synthesis indicated that interventions with the primary aim of reducing workplace sitting time were able to achieve some degree of reduction, but the magnitude of this change varied greatly. Interventions which involved the installation of sit-stand desks tended to demonstrate larger effect sizes compared to other forms of intervention. However, depending on the priorities and the financial limitations of organisation, the initial upfront costs associated

with ergonomic adaptations may not be feasible, even if there were longer-term financial gains in terms of reduced sickness absence and increased productivity. Therefore, there is scope for developing and evaluating interventions with a lower initial associated cost to potentially encourage a greater uptake amongst a range of organisations.

The qualitative synthesis conducted during the review has provided the first in-depth exploration of the factors that aid the effective development and implementation of workplace sitting interventions. The findings indicated a need for comprehensive intervention development, implementation and evaluation, which should focus on a range of strategies including: understanding the barriers and facilitators to participating in workplace sitting interventions; identification and use of a theoretical model; gaining management support and ensuring an intervention aligns with existing policies/strategies; the use of participatory approaches; conducting a feasibility or pilot study; developing and implementing an action plan; and undertaking a comprehensive process and outcome evaluation. In addition, an under-reported cross-cutting issue related to the consideration of the context within which interventions are undertaken. Comprehensive and detailed consideration and reporting of this contextual information, as well as details relating to the development, implementation and process evaluation, needs to be encouraged during the design and dissemination of research relating to interventions to reducing workplace sitting time.

On the basis of the qualitative evidence synthesis, an operational framework was produced to inform the planning of future interventions to reduce workplace sitting. This framework needs to be formally tested in a range of workplace settings to establish whether or not it is fit for purpose, whether it adequately captures all relevant contextual factors, and to also explore any potential missing elements in the framework. The findings of the framework testing are reported in subsequent chapters of this thesis and was achieved by firstly conducting focus groups with employees from a range of organisations to explore the barriers and facilitators to reducing workplace sitting time. The framework was then used to develop, implement and evaluate interventions within organisations of different size and sector. This work, in turn, will help to ensure that the potential of the framework to inform the development, implementation and evaluation of effective interventions to reduce workplace sitting time is realised.

Chapter 3: Phase 1 – Understanding barriers and enablers to sitting less at work in organisations of different size and sector

3.1. Chapter summary

As highlighted in Chapter 2, to support the development of more effective interventions, an assessment of barriers and enablers to sitting less at work should be conducted as part of a tailored intervention development process. In order to address these barriers and enablers during the development and implementation of interventions, it is important to understand how they could differ in different types of organisation, a question that has not been explored in previous studies. Therefore, Phase 1 sought to identify barriers and enablers to sitting less at work and determine whether these varied between organisations of different size and sector.

A qualitative study design was used. Four organisations participated: a small business, a charity, a local authority and a large corporation. A total of ten focus groups were conducted, comprising 40 staff volunteers. Focus groups were audio-recorded and transcribed verbatim. Transcripts were then thematically analysed using pre-defined themes, but also allowed for emergence of additional themes.

Barriers and enablers which were consistently raised by participants across all four organisations primarily included: individual-level factors such as habits and routines, and personal motivations and preferences; and factors relating to the internal physical environment. Barriers and enablers that differed by organisation mainly related to: organisational-level factors such as organisational culture, organisation size, and ways of working; and factors relating to the broader social, economic and political context such as the idea of presenteeism, and the impact of wider economic and political issues.

Phase 1 found that although some themes were consistently raised by participants from organisations of different size and sector, participants from these organisations also experienced some different barriers and enablers to sitting less at work. For future research or practice, the study findings highlight that organisation-specific barriers and enablers need to be identified and addressed during the development and planned implementation of interventions to reduce workplace sitting time.

3.2. Background

The integrative review conducted in Chapter 2 [106], identified key considerations for the development, implementation and evaluation of interventions to reduce workplace sitting time. A key point highlighted in

the review was the importance of understanding local barriers and enablers to sitting less at work as the first step in the development of interventions. Identifying, and addressing barriers and enablers as part of the intervention development process is also consistent with guidance from the MRC [84] and supports the development of more effective interventions [106]. To date, only a small number of studies have reported barriers and enablers to workplace sitting interventions as a first step to intervention development [154–156]. More frequently, qualitative studies have explored barriers and enablers as a standalone study, without explicitly stating that these findings will then be used to inform the development of interventions [157–159].

A systematic review by Hadgraft et al. [160] aimed to identify and synthesise qualitative evidence on factors that influenced feasibility and acceptability of sitting less at work. Common barriers and facilitators to sitting less at work (not related to specific interventions) identified in the review were grouped using the ecological model of sedentary behaviour [161, 162] into: individual-level factors; work-related factors; organisational and social factors; and environmental factors. Individual-level barriers were identified as: sitting is a habit; and sitting less is an individual choice based on personal motivation. Work-related barriers included: the nature of the job; perceived loss of productivity; opportunities to move away from the desk was dependent on job role, e.g., those with management responsibilities or those with more autonomy over workload planning. Social and organisational-level barriers were reported as: the social norms of sitting; concerns about what colleagues may think or concerns about disturbing colleagues; and unsupportive workplace cultures. Finally, environmental-level barriers included: the use of furniture designed for sitting; and insufficient facilities to encourage incidental activity. In terms of enablers to sitting less at work, these primarily included organisational commitment or support, management permission to sit less, pleasant outdoor surroundings, good weather, and having centralised equipment away from individual desk space. The review synthesised findings from a variety of studies set in different countries and involving different types of organisation. The review reported that there was some evidence of differences in terms of cultural norms. For example, one study conducted in Singapore found that standing could be perceived as aggressive, whereas a study conducted in Sweden did not identify any cultural or social norms as barriers to sitting less at work. However, the review did not explore whether there were any differences in perceived barriers and enablers based on organisation type, such as differences by sector and size, which is needed to fully understand how much of an influence such contextual factors could have on the effectiveness of interventions.

A recent cross-sectional study of participants across 24 different worksites from academic, industrial and government sectors [151] found that there were both within and between workplace variations of objectively measured sedentary behaviour across the entire social ecological spectrum. However, the study only assessed a limited range of individual (job type and work engagement), cultural (lunch away from desk, walking at lunchtime, and face-to-face interaction), environmental (personal printer and office type) and organisational (sector) factors. In addition, the study was limited by the lack of contextual information collected. For example, regarding the cultural factors assessed, which related primarily to information on lunchtime and the

opportunities this could bring to sit less at work, relevant contextual information such as where and when lunch is eaten, how long is the lunch break and whether there is a lunch break policy, was not collected. The inclusion of contextual information, obtained via exploring the perceptions of barriers and enablers to sitting less at work from employees from a range of different types of organisations, would help to provide useful insights into how contextual factors influence workplace sitting behaviours. Furthermore, such contextual information can be used to inform the real-world development and implementation of interventions to sit less at work [106]. Therefore, an in-depth exploration of contextual factors that present as barriers or enablers to sitting less at work for different organisations is required.

3.3. Aims and objectives

Phase 1 had two aims:

1. To determine whether or not barriers and enablers were consistent across four organisations, which differ in terms of size and sector and to determine how organisation type could influence barriers and enablers to sitting less at work
2. To explore barriers and enablers to sitting less at work, as a precursor to intervention development.

The objectives of Phase 1 were to:

- a) Recruit participants from each of the four participating organisations
- b) Conduct focus groups in each of the four participating organisations
- c) Audio-record and then transcribe verbatim the discussions from the focus groups
- d) Thematically analyse the findings from the focus groups initially as a whole and then by organisation
- e) Disseminate the findings in the form of an organisation-specific report.

3.4. Methods

To address the aims of Phase 1, a qualitative study design was adopted. A qualitative study design allowed for: an in-depth exploration of barriers and enablers to sitting less at work; the emergence of new themes or ideas that have not been previously identified in the literature; and an understanding of how these barriers and enablers differ by organisation and what the reasons for this could be [163].

3.4.1. Organisations

Phase 1 aimed to recruit a variety of organisations of varying sector and size. This study purposefully recruited four organisations in South Yorkshire, UK: a small business (private sector); a charity (voluntary sector and

large); a local authority (public sector and large); and a large corporation (private sector and large). The small business was recruited opportunistically via a personal contact and the charity and local authority via professional contacts. The large corporation was suggested by a member of the public involvement panel (see Appendix 1d for a summary of the discussions from the third public involvement meeting held in September 2017). See Table 3.1 for a summary of organisation characteristics. None of the organisations had any formal sedentary behaviour initiatives in place, although the local authority had a bank of standing desks, which could be used as hot desks by any member of staff.

Table 3.1: Organisation characteristics

| Characteristic | Small business | Charity | Local authority | Large corporation |
|------------------------------------|--|---|--|--|
| Total number of employees | 8 | 488 | 4,146 | 119,300* |
| Sector | Private | Voluntary | Public | Private |
| Description of organisation | Provides information technology support to a range of other businesses and comprised one Managing Director, two managers and five employees. | Manages homes, and provides care and support to vulnerable people. Departments include: Directors, Computer Services, Finance, Customer Services, Human Resources, Performance and Central Services, New Business, Housing Services, and Property Services. | Set in a Metropolitan Borough. Work covers four Directorates: Adults, Health and Wellbeing; Corporate Resources; Learning and Opportunities; and Regeneration and Environment. | Banking business. Only one branch participated. This branch had both business and corporate teams and comprised 25 staff and two team leaders. |

**Although there were 119,300 employees in total in the large corporation, the recruitment email only reached 27 members of staff who were based within the two teams that had agreed to participate in the project.*

3.4.2. Participants

Convenience samples of participants in sedentary job roles were recruited from each of the four organisations via an email along with the participant information sheet sent by a named contact within each organisation (see Appendix 4a for a copy of the recruitment email and participant information sheet). Both the email and participant information sheet were produced with the support of the public involvement panel (see Appendix 1d for a summary of the discussions from the second public involvement panel meeting held in February 2017). In the small business, all eight employees received the recruitment email; in the charity and local

authority, only office-based staff received the recruitment email; and in the large corporation only one branch of the business agreed to participate, which comprised 25 members of staff and two team leaders.

3.4.3. Procedures

Staff who had expressed an interest in participating were contacted via email to arrange suitable times for the focus groups. Focus groups were conducted with participants at each organisation between January 2017- January 2018. A focus group methodology was used to encourage dynamic idea generation amongst the group, leading to an in-depth discussion and the collection of rich data [164]. Focus groups were held during working hours in meeting rooms within the participants' workplaces. The number of focus groups per organisation and number of participants in each focus group was based on participant availability to ensure that the maximum number of workers participated, rather than aiming for data saturation. All participants provided written informed consent (see Appendix 4b for a copy of the consent form) and data confidentiality and data protection measures were adhered to (see Appendix 4c for a copy of the ethics application detailing these measures). Ethical approval for this phase of the study was obtained from the School of Health and Related Research Ethics Committee at the University of Sheffield (ref no. 012219) (see Appendix 4d for a copy of the ethics approval letter).

Participants completed a brief questionnaire providing some basic demographic (age, gender, ethnicity, educational attainment) and work-related (job title, full time equivalent) details, and a self-reported estimation of percentage time spent sitting at work (see Appendix 5 for a copy of the questionnaire). Focus groups followed a topic guide (see Table 3.2), but were semi-structured to allow topics to be covered in a different order as appropriate, with additional follow-up or clarifications questions being asked when necessary. This topic guide was pilot-tested during the first focus group; no amendments were necessary. Focus groups lasted 30-60 minutes, were audio-recorded and transcribed verbatim.

Table 3.2: Focus group topic guide

| Topic covered | Template questions |
|--|--|
| General perceptions about workplace sitting including its benefits and possible detrimental effects | <ul style="list-style-type: none"> a) What is your experience of/thoughts on workplace sitting? b) What is known, if anything, about the association between sitting and health? c) Do you suffer from any health effects of prolonged sitting? |
| Current barriers to reducing sitting time in the workplace | <ul style="list-style-type: none"> a) Are there any physical barriers e.g., disabilities/health problems/pregnancy? b) Are there issues regarding lack of understanding the importance of prolonged sitting on health? c) What are the norms in your office? Is it the norm to work standing or to sit less at work? What would your colleagues think? d) What is the management like? How may the organisation hinder you from sitting less? e) What is the environment that you work in like? Any barriers linked to this? f) Do you feel a need to remain seated? Is it something that concerns you? |
| Current enablers to reducing sitting time in the workplace | <ul style="list-style-type: none"> a) Are there any physical enablers that may encourage you to sit less, e.g., musculoskeletal problems associated with prolonged sitting? b) Do you think having a good understanding of the importance of prolonged sitting in terms of health helps to reduce sitting time at work? c) What are the norms in your office? Do these help you to reduce your workplace sitting time e.g., supportive colleagues, others trying to reduce sitting? d) What is management support like? How does the organisation support you? e) What is the environment that you work in like? Are there any existing enablers linked to this e.g., centralised printers, green space? f) Do you feel a sense of motivation to sit less? Is it something that helps you? |

3.4.4. Analysis

Transcripts were uploaded onto NVivo Version 11 and a thematic analysis was undertaken. This was initially done using pre-defined themes, which were taken from the findings from the integrative review reported in Chapter 2. These themes included: the nature of work, workload, time pressures, and individual working-style; feelings of self-consciousness or being a distraction to others; physical health effects, stress and impact on productivity; peer and/or management support and presence of social norms; the existing work

environment; and the cost of an intervention. These were then re-named according to the data collected. Inductive thematic analysis was also carried out, which allowed for the emergence of additional themes. From both the pre-defined and newly emergent themes, higher-order themes were determined forming a hierarchical structure.

The transcripts were read multiple times to aid familiarisation with the content prior to commencing the formal analysis. Data were coded, from which hierarchical themes emerged. Direct quotations were used to describe the themes, enhancing credibility of the analysis. Data were firstly analysed as a whole dataset to determine the overall themes and sub-themes. These results were then broken down by organisation to explore similarities and differences.

3.5. Results

A total of 40 participants took part in ten focus groups: two focus groups in the small business (n=6); three focus groups in the charity (n=15); three focus groups in the local authority (n=14); and two focus groups in the large corporation (n=5). Table 3.3 presents key participant characteristics by organisation. Participants' job roles varied and included management, administration, technical support and professional roles.

Table 3.3 demonstrates that the majority of participants in the focus groups were well-educated, White British females who worked full-time and self-reported sitting at work for 75-100% of the time. However, it should be highlighted that there were some differences by organisation. For example, in the small business the majority of participants were younger males, and in the local authority and large corporation, the participants had a higher average age than the other organisations.

Table 3.3: Participant characteristics

| Characteristic | Small business | Charity | Local authority | Large corporation | Total |
|---|----------------|---------|-----------------|-------------------|-------|
| Total number of participants | 6 | 15 | 14 | 5 | 40 |
| Total number of focus groups | 2 | 3 | 3 | 3 | 10 |
| Number of participants in each focus group | 3, 3 | 4, 5, 6 | 4, 4, 6 | 3, 2 | 40 |
| Total number of senior management-level participants | 3 | 5 | 4 | 0 | 12 |
| Mean age | 31 | 38 | 41 | 43 | 38 |
| Female (n) | 1 | 9 | 10 | 4 | 24 |
| Ethnicity | | | | | |
| - White British (n) | 6 | 14 | 11 | 5 | 36 |
| - Other (n) | 0 | 1 | 3 | 0 | 4 |
| Highest educational attainment | | | | | |
| - Degree or equivalent (n) | 0 | 8 | 8 | 2 | 18 |
| - Higher education (n) | 1 | 1 | 3 | 0 | 5 |
| - A level or equivalent (n) | 3 | 1 | 1 | 1 | 6 |
| - GCSEs grade A*-C or equivalent (n) | 1 | 3 | 1 | 1 | 6 |
| - No qualifications (n) | 0 | 0 | 0 | 0 | 0 |
| - Other (n) | 1 | 2 | 1 | 1 | 5 |
| Full-time (n) | 5 | 13 | 13 | 4 | 35 |
| Self-report % workday sitting time | | | | | |
| - 0-25% (n) | 0 | 0 | 0 | 0 | 0 |
| - 25-50% (n) | 0 | 1 | 0 | 0 | 1 |
| - 50-75% (n) | 1 | 3 | 8 | 0 | 12 |
| - 75-100% (n) | 5 | 11 | 6 | 5 | 27 |

The initial analysis of all transcripts identified barriers and enablers which encompassed 13 lower-order themes from which emerged four higher-order themes. These higher-order themes were identified as: individual factors; organisational factors; the internal physical environment; and the broader social, economic and political context. Themes are not intended to be mutually exclusive, but cut across and between the different levels of influence. Table 3.4 highlights these higher-order themes and their associated lower-order themes by organisation.

Table 3.4: Summary of key themes and sub-themes by organisation

| Themes | Sub-themes | Organisation | | | |
|--|--|--------------|---|----|----|
| | | SB | C | LA | LC |
| 1. Individual factors | 1.1. Habits and routines | X | X | X | X |
| | 1.2. Personal motivations and preferences | X | X | X | X |
| | 1.3. Concerns about distracting colleagues | | X | X | |
| 2. Organisational factors | 2.1. Nature of work | X | X | X | X |
| | 2.2. Organisational culture* | X | X | X | X |
| | 2.3. Organisation size | X | | | |
| | 2.4. Ways of working | | X | X | X |
| 3. The internal physical environment | 3.1. Building location, facilities and layout | X | X | X | X |
| | 3.2. The workplace is designed for sitting | X | X | X | X |
| | 3.3. Current equipment and furniture | | | X | |
| 4. The broader social, economic and political context | 4.1. Sitting is the social norm, standing is counter normative | X | X | X | X |
| | 4.2. Presenteeism | | X | X | |
| | 4.3. Economic and political issues | | | X | |

NB: SB = Small business, C = Charity, LA = Local authority, LC = Large corporation

X = sub-theme present

*All organisations identified issues relating to organisation culture as presenting barriers and/or enablers, but within this theme there was a great deal of variation.

Sub-analysis by organisation revealed some key similarities and differences in terms of the barriers and enablers to sitting less at work experienced by staff.

3.5.1. Individual factors

Two of the three individual-level sub-themes that influenced sitting behaviours were found to be consistent across the four organisations, namely: habits and routines; and personal motivations and preferences. The third sub-theme, concerns about distracting colleagues, varied by organisation.

a) Habits and routines

A variety of different habits and routines were felt to facilitate sitting less at work, as participants described habits that they currently adopt to be more active, such as walking to meet customers, making a drink or using the toilets on a different floor. One participant stated,

“And so now in my new team when I feel my concentration flags, so you just feel like you know that post-afternoon time. I always take that opportunity to take a drink. And even just use the toilets that are like the floor down or something like that. Basically, finding a way around all that. Well, if I am taking a drink then actually just look out the window and take a few minutes where I can actually rest

my head and then come back. I found having a drink is, and making it yourself is nice.” (Participant I, local authority).

b) Personal motivations and preferences

A variety of different motivators were reported to facilitate sitting less across the organisations. For example, musculoskeletal health was identified as a motivator for some participants, with sitting breaks being prompted by feeling stiff or sore. Experiencing benefits of going outside in the fresh air was also highlighted, as one participant explained,

“Because when you do get to go outside and that fresh air hits you even just for a few minutes, it’s nice... Literally just blowing the cobwebs away from your brain.” (Participant A, large corporation).

The “need” for a break was signified by waning productivity or an awareness of being sat for too long.

A further motivation which facilitated sitting less was taking productive or purposeful sitting breaks, such as breaking-out to chat with colleagues, which was seen to have additional benefits in terms of building relationships and improving efficiency, as one participant explained,

“I think being that bit more sociable activity with the person you tend to get a bit more of a rapport. So probably later on down the line they are a bit more than rather than hide away, they will come and see you. I think that works well yeah just going to see them I think.” (Participant H, charity).

However, the comfort and convenience of sitting was found to be a motivation for remaining seated and a barrier to being more active to the extent that one participant stated,

“Because HR [Human Resources] are in the office... if you wanted to ask someone a question, you just shout across the office.” (Participant B, charity).

c) Concerns about distracting colleagues

This theme was a more prominent issue for the charity and local authority as a barrier to sitting less and being more active at work. It related to the perception that being more active could distract or disturb colleagues, as described by one participant,

“I think as well because so many staff sit in one building, that even when you are going round about to talk to someone, you could be stood for two minutes but you are surrounded by other people. You don’t want to get in their way or distract them. So, to actually get up and move about a bit is kind of quite difficult.” (Participant F, charity).

3.5.2. Organisational factors

This theme provided the most variation by organisation. All associated sub-themes, except for the nature of work, were found to have important differences relating to barriers and enablers to sitting less at work.

a) Nature of work

The nature of work proved to be a significant barrier to sitting less for many participants. Within organisations, certain job roles were highlighted as being particularly sedentary, such as customer services work and administration roles. In addition, certain tasks, which required intense concentration, promoted periods of prolonged sitting,

“...sometimes you can just be so engrossed in what you are doing that you totally forget and you think oh I haven’t been to the toilet for a while.” (Participant F, large corporation).

Another participant stated,

“...if I’m on something that I need to focus on, then that would motivate me to sit at my desk and finish it and you know work through lunch or work past finishing time.” (Participant E, small business).

The nature of work was also perceived as providing limited opportunities to take sitting breaks or to be more active. For example, one participant stated,

“I think it’s really difficult when you work in a setting where you don’t... have lots of meetings or outings to the community or whatever. If you are sort of drawn in a project or a business support environment, how to encourage sort of people getting up and doing different things.” (Participant I, local authority).

b) Organisational culture

This sub-theme was an issue brought up by all organisations, but encompassed many different aspects, each of which differed by organisation. Firstly, conflicts between the corporate line and what transmits down to staff was an issue that only appeared in the local authority. This was particularly in reference to encouraging staff to take breaks away from the computer screen as part of the Display Screen Equipment regulations and was described by one participant,

“And yet there is a message, take regular breaks from your desk. So, there is that corporate message but it isn’t really embedded.” (Participant F, local authority).

Secondly, the perception that there needs to be a reason or excuse to move away from the desk was identified as a barrier to sitting less, particularly by the charity participants. One participant stated that they,

“Try and use an excuse to get up and move about a little bit.” (Participant A, charity).

Another said,

“You have got to have a reason for it. So, you’ve got to be going to see someone or to do something.” (Participant G, charity).

This links into the individual factor of a motivation for sitting less being taking a purposeful or productive break.

Thirdly, lack of time and workload pressures were also highlighted as significant barriers to sitting less at work, predominantly by the large corporation and local authority participants. One participant described workload pressures as,

“There’s never an end. There’s always so much on. It’s just like right you have to do this today. You just sort of sit there with your blockers on and do it.” (Participant B, large corporation).

Another participant highlighted lack of time and the resulting pressures that this brings,

“And I know particularly just in my directorate alone, a lot of things are coming in short notice. So, it’s like the pressure’s on you. You can’t plan in time to do you know a leisure thing here or an outing thing here because you are getting things landed on you last minute. And then it’s all just about sticking to your computer and get through it as quickly as possible.” (Participant J, local authority).

Finally, the role of managers was identified as a key barrier to sitting less and moving more at work by staff in the local authority. For instance, some participants reported the lack of management support or micro-management, particularly from middle managers, as a barrier to sitting less at work, as highlighted by one participant,

“I’ve actually had a couple of times when I’ve seen like either former colleagues or I can be actually talking about work with somebody like you say away from your desk. And if you are longer than you’ve kind of indicated that you might possibly be. Or if they thought you were just going to the toilet and you might have bumped into someone so oh while I’m here I’ll just catch up with you about you know. Your managers can say sometimes are you alright, where’ve you been? Or I’ve actually known a new manager come to the toilets to try and find me.” (Participant G, local authority).

However, in contrast, participants from the small business and large corporation reported that their managers were relaxed and flexible, and that this allowed them to use their time more flexibly and meant that they did not feel the same pressures in terms of being accountable for all of their work time,

“We’ve got a really relaxed manager. Yeah, if you’ve got something on in the morning personally and you are off as long as you get your work done.” (Participant C, large corporation).

c) Organisation size

Organisation size was only identified as an important organisational factor by the small business. The fact they were a small organisation was suggested to be an enabler as they would remind each other to sit less at work,

“...once it’s on the radar we will be reminding each other.” (Participant A, small business).

However, the lack of financial support associated with being a small business meant that they felt unable to afford larger-scale initiatives to improve their health and wellbeing, as explained by one participant,

“And I think group activity is healthy for a working environment but we are not a corporate, we are not an organisation that has enough cash to sort of splash out on a Segway day. You know what I mean?... It would be nice you know but we don’t have that kind of cash around which you know other outfits might do.” (Participant A, small business).

d) Way of working

This sub-theme relates to both the use of flexi-time and homeworking. The use of flexi-time was identified by participants from the local authority and charity as a barrier to sitting less at work. This is due to staff trying to build-up their time in order to get an additional day-off, as one participant describes,

“People are trying to cut their dinner hour as short as possible to build time up or because of their working patterns and so on.” (Participant J, local authority).

It was felt that this then puts pressure on individuals to work harder and take fewer breaks.

Homeworking was reported as an enabler to sitting less and moving more whilst working by some participants from the local authority and large corporation due to the increased flexibility and convenience that homeworking allows. Conversely, some participants from the local authority felt that they were more sedentary when working from home due to the ingrained stigma that when working from home you could be perceived by colleagues to be “slacking”. To counter this, these participants felt that they had to be continually available when working from home, as one participant stated,

“But when you are at home you want to be available because if you move away from your table and someone phones you, that’s all that’s there to distract you. You are working from home. You should be available to take this phone call. So that’s where that stigma is all perception isn’t it? Someone’s not doing what they should be.” (Participant I, local authority).

3.5.3. The internal physical environment

Two of the three sub-themes relating to internal physical environment were found to be very consistent across the four organisations, namely, building location, facilities and layout, and the workplace is designed for sitting. The sub-theme, current equipment and furniture, was found to vary by organisation.

a) Building location, facilities and layout

The building location, facilities and layout presented both opportunities and limitations to sitting less at work within the four organisations. Although there were inevitable differences within this theme across organisations resulting in variations in the details of the discussion, this sub-theme as a whole was reported consistently by participants from all organisations. For example, some participants from the charity reported that, in their workplace, the location and state of the stairs was a barrier for using them, whereas local authority participants explained that, in their workplace, the stairs are central and you reach them before the lift, which promoted their use. A lack of office space and break-out areas was a perceived barrier for sitting

less by participants from all organisations, due to the fact there was nowhere to go within the building when breaking away from the desk that would discourage sitting. For example, one participant stated,

“there’s no breakout spaces where there is an opportunity to stand. Everywhere where you can break-out or meet is a chair-based sort of scenario.” (Participant E, local authority).

Another stated,

“There are no real informal meeting areas.” (Participant F, charity).

b) The workplace is designed for sitting

The idea that “we designed our workplace to be a sitting workspace” (Participant A, small business) was described by many participants. The way that the office space is set-up with desks, standard meeting tables with chairs, lack of break-out spaces all promotes sitting and discourages movement. For example, one participant stated,

“So, you’ve got a PC on your desk. Your phone’s on your desk. There’s a lot of anchors to keep you at your desk, whether you are drafting a report, working emails or...” (Participant B, charity).

c) Current equipment and furniture

Current equipment and furniture primarily related to the pre-existence of standing desks, which only the staff in the local authority had access too. On the surface, this presented itself as an opportunity to sit less at work. However, there were associated barriers to the use of these desks, such as anxiety that they will “stand out”, the perception that using standing desks would be a distraction to colleagues, and practical issues with the desk, e.g., not having enough desk space and cabled incorrectly. As a result of these barriers, the standing desks were reported to be underused. One participant stated barriers to use of these standing desks involved,

“A number of things, first of all the desks are not within the teams you are in, so you're out on your own. They are not connected to the phone network etc., so if you are there you can just work with your laptop or read documents. They are sat in a very open area, so anyone who goes across and uses them are in direct view, so there is, some people think well what are you doing using standing desks etc.” (Participant K, local authority).

3.5.4. The broader social, economic and political context

One sub-theme relating to the broader social, economic and political context was found to be consistently raised by all four organisations, namely, sitting is the norm and standing is counter normative. The other two related sub-themes, the idea of presenteeism and economic and political issues, were found to vary by organisation.

a) Sitting is the norm and standing is counter normative

The perception that sitting is the norm was identified as a barrier to sitting less at work by many participants from all four organisations, as one participant stated,

“It’s normal to be sat at your desk.” (Participant A, charity).

Furthermore, breaking that social norm by standing at work was also highlighted as problematic, as one participant described,

“You are breaking from the norm, aren’t you? If you stand up it’s even if you are just sitting at your desk not interacting with any other members of staff, it still seems a bit odd to like stand up and take a bit of a stretch just because nobody else is doing it you know.” (Participant B, small business).

Meetings were particularly described as a barrier to sitting less due to the additional pressures and expectations of social norms in this setting,

“We’ll have meetings that you know might be in an office space sector where you will go and you will have a sit-down meeting because they are in that same sort of work environment.” (Participant F, local authority).

Furthermore, the frequency and length of meetings in some of the organisations was an additional barrier,

“There’re a lot of meetings in this organisation. There’s an awful lot. I’ve never known anything like it really. There’s loads and loads of meetings which obviously generally you are sat at. We do have some where you are kind of walking around, which is nice, but usually you are kind of sat down.” (Participant J, charity).

b) Presenteeism

The concept of presenteeism was described by participants as: to be perceived as being productive, you need to be seen to be at your desk. This concept was perceived as a barrier to sitting less and moving more primarily by participants in the charity and local authority, and to a lesser degree in the large corporation. This theme did not emerge at all in the small business. One participant stated,

“It’s that presenteeism isn’t it? I guess just being seen. Especially I imagine, like I am in the team of there’s a bank of six desks and if someone’s gone you immediately know because you have to be aware because if someone calls them where they are and so they will state where they are. And thinking they’ve been off all day and you’ll look and maybe they’ve been in meetings. So, it does seem like everyone has access to the calendars about you. You have I guess accountability to your team as well.” (Participant G, local authority).

c) Economic and political issues

Economic and political issues emerged as a barrier to sitting less at work in the local authority. This particularly referred to financial pressures facing local authorities, which meant that initiatives primarily for

enhancing employee wellbeing were not the priority. Furthermore, due to a pressure on managers to demonstrate that their staff are essential, sitting less and moving more was passively discouraged by the need to be sat at desks, which is also linked to the idea of presenteeism above. This was highlighted by one participant,

“I think for some managers it is all about the cuts being made. You know making sure their team are visible. And then that means that they’re essential because they are visible. Not necessarily but you know the productivity of the team or the need for that team is you know greater than visibly being somebody sat at their desk.” (Participant G, manager, local authority).

In addition, as the local authority is publicly funded, they are often under pressure due to external political factors. One participant described this,

“Yeah, there’s a lot of pressure and financial you know pressures as well as culturally we are being scrutinised to a level that you know Grenfell fire [large tower block fire in the UK] and stuff not to bring that up but the councils are under pressure. This is public money that we are spending, so we need to be seen to be spending it correctly.” (Participant K, local authority).

3.6. Discussion

Phase 1 sought to identify barriers and enablers to sitting less at work and whether they varied in organisations, which differed in terms of size and sector. This study found that, although some themes were consistently raised by participants from different organisations, some key differences were highlighted which could be important to consider when developing and implementing interventions to reduce workplace sitting.

Overall, four major influencing factors were identified: individual factors; organisational factors; the internal physical environment; and the broader social, economic and political context. These are consistent with the ecological model of sedentary behaviour [161, 162], which proposes that sedentary behaviours are influenced at multiple different levels, such as at an individual-, social-, community/organisational-, environmental-, and policy-level, which interact and feedback to each other as part of a dynamic system. Hadgraft et al. [160] recently conducted a qualitative systematic review, which explored barriers and enablers to sitting less at work and also identified that themes could be grouped in line with the ecological model of sedentary behaviour [161, 162]. Furthermore, the sub-themes identified by Phase 1 were broadly consistent with barriers and enablers identified by the review by Hadgraft et al. [160].

Sub-themes identified in Phase 1, which were consistently raised by participants from all four organisations, included: habits and routines; personal motivations and preferences; the nature of work; building location, facilities and layout; the fact that the workplace is designed for sitting; and the idea that sitting is the norm and standing is counter normative. These similarities mainly referred to individual factors and issues relating to the internal physical environment, which tend to be associated with the inevitable constraints of office-

work and being “anchored” to the desk. These constraints were similar across all organisations as this study intended to assess barriers and enablers to sitting less at work in organisations where office-based work was predominant, so this finding is unsurprising.

Although sub-themes relating to the internal physical environment were broadly consistent across the four organisations, the actual environments were different for each organisation. These differences do not necessarily reflect the size or sector of the organisation, but rather of the availability of internal facilities and physical location of the building. One difference in the local authority related to barriers using and accessing standing desks. The other participating organisations did not have access to standing desks, explaining why this theme was specific to the local authority. Many intervention studies have focused on standing desks or sit-stand desks as the “solution” to the sedentary behaviour in the workplace problem [59, 65, 66, 88, 119]. However, only barriers (not enablers) to using the standing desks were reported by staff in the local authority, which could indicate that such an intervention, even if afforded, may not be appropriate in every organisation. The local authority demonstrated other competing and interacting influences that mitigated against the use of standing desks, for example the organisational culture impacted on their use, as participants reported that they did not want to “stand out” or look foolish. This highlights how ingrained office behaviours are and how this related to professional identities and status.

There were some other notable differences between the four organisations, which particularly related to organisational factors and the broader social, economic and political context, with the latter having not previously been reported in the occupational sedentary behaviour literature. The sub-theme of organisational culture, described as “a set of collective norms that govern the behaviour of people within the company” [165], encompassed a range of issues which differed by organisation. For example, participants from the local authority raised issues relating to conflicts between the corporate line, i.e., positive messages to sit less and move more at an organisational-level/from Directors, and what was transmitted down to staff via middle management, where staff felt pressure to be seen working at their desk. In addition, participants from the local authority reported negative impacts of the role of the manager through lack of support to sit less at work and through the need to account for their time at work. In contrast, participants from the small business and the large corporation reported the role of the manager as an enabler to sitting less at work. Furthermore, participants from the local authority and the large corporation identified lack of time and workload pressures as significant barriers to sitting less, whilst participants from the charity highlighted the need for a reason to move more as a barrier. Organisation size was only identified by the small business as an issue, where participants highlighted that for them, working in a small organisation was both an enabler, in terms of peer support, and a barrier, in terms of a lack of funding for initiatives to support staff sitting less at work. These issues could be dependent on the personalities of individual managers/leaders, as peer support could be obtained from small supportive internal team structures within a large organisation, but equally there could be an ingrained management ethos related to the culture of an organisation, which could influence people’s

actions and behaviours [165]. Having a clear understanding of the various impacts the prevailing culture of an organisation has on its staff is important, as it will ensure some of these organisation-specific barriers and enablers are accounted for when developing and implementing interventions.

The way of working was also shown to vary by organisation. The misuse of flexi-time (i.e., employees working longer hours to gain time off) was highlighted by the local authority and charity as a barrier to sitting less at work and also is in line with findings from another study [166]. Homeworking was described by the participants from the charity and local authority (where homeworking was an accepted practice) as an enabler due to the flexibility and convenience. However, some participants from the local authority also reported stigma associated with homeworking (perceiving that colleagues think they are “slacking”, therefore, to counter this, needing to be always available) as a barrier to being more active when working from home. The idea of flexible working is to give employees some choice over how much, when and where they work in order to enhance work-life balance [167]. The suggestion that flexible working, which in this study included the use of flexi-time and working from home, could negatively impact daily sitting time is consistent with findings from a previous study by Olsen et al. [168]. This qualitative study of office-based workers in a financial services organisation in Brisbane, Australia found that flexible working increased sitting time due to increases in electronic communications, as a result of employees being unaware where their colleagues were (at home or the office). However, this study did not report any stigma related to homeworking, or staff using flexi-time in a way that it was not originally intended. The differences in the reasons for potentially increased occupational sitting time between the study by Olsen et al. and the findings presented in Phase 1 could be due to differences in organisational culture of the organisations included in the two studies.

Homeworking is a particularly important issue to consider given the way in which the working environment has been changing, with many organisations in the UK offering flexible working options to their employees [167]. Furthermore, since the COVID-19 (coronavirus disease 2019) pandemic, homeworking has become more commonplace, with many organisations (particularly office-based organisations) requiring that their employees work from home. In 2019, 27% of those in employment in the UK reported some homeworking [169], but in April 2020, at the height of the first UK national “lockdown”, this had increased to 47% [170]. These enforced changes to working practices could have altered the stigma employees perceived when working from home with the potential for more acceptance of this practice given that the choice to work from home had been removed. Nevertheless, the requirement for on-going use of electronic communication could result in increases to sitting time. Further work assessing the impact that the COVID-19 pandemic and associated lockdown measures have had on sitting “at work” (acknowledging this may be at home) is therefore warranted.

With the exception of the sub-theme, sitting is the norm and standing is counter normative, the impacts of the broader social, economic and political contextual factors were also found to vary by organisation. Economic and political issues were only raised by participants from the local authority. Being a publicly funded

organisation in a context of continually limited funds and funding cuts and external political pressures, it was felt that staff needed to be visibly working to demonstrate that they are needed, hence making them more “deskbound” to conform to the organisation’s standards of behaviour. In addition, it was reported to be difficult to justify spending on initiatives to encourage staff to sit less at work. These impacts of the wider economic and political issues were not explicitly reported in the other organisations.

The concept of presenteeism was found to be a prominent barrier to sitting less for the local authority and charity. Presenteeism is a normative practice played out in organisations. However, it is influenced by broader social discourses about productivity and human value, but at an organisational level, could be influenced by the internal culture and expectations. The most commonly used definition of presenteeism comes from Johns [171], “showing up for work when one is ill”. However, Phase 1 found that employees interpreted the concept of presenteeism differently and purely related it to the idea that sitting at your desk (at work or at home) and being contactable is perceived as “working” (regardless of whether or not any work was actually being done). This also links to the issues relating to flexi-time and homeworking where perceptions about building up flexi-time and stigma associated with homeworking appear to be underpinned by the broader social factor of presenteeism. This interpretation of presenteeism therefore acts as a barrier to employees taking regular breaks from sitting as the perception is that it equates to taking regular breaks from working. This barrier was also reported in the qualitative review by Hadgraft et al. [160].

Reasons for the differences between organisations identified by Phase 1 could, in part, be explained by differences in organisational cultures. Cultural factors which have been identified as potentially important for informing the time staff spend sitting at work include details of local organisation processes and characteristics, e.g., organisation size, sector, and the wider political and economic landscape [150]. The political and economic landscape seemed to be particularly relevant to the experiences of participants in the local authority. There was a clear sense that, as local authorities are publicly funded and subject to high levels of scrutiny and public accountability, there was an additional pressure to be using this money wisely and appropriately on public services. The current political and economic landscape is therefore a key factor to be aware of when developing sit less at work interventions in local authority organisations. Furthermore, organisation size seemed to play a role in the small business and could have contributed to the enablers which emerged here, being a close-knit team. As identified by Such and Mutrie [150], the various contextual domains are “mutually reinforcing”, i.e., wider political and economic factors could influence other organisational cultural domains, such as organisational values, strategy, structures and operations. Therefore, addressing the issue of organisational culture to support interventions to reduce workplace sitting, could be potentially beneficial.

Implications for research and practice

Phase 1 has implications in both research and practice. This study's finding that there were variations in barriers and enablers by organisation suggests that a "one-size-fits-all" solution to sitting less at work is not suitable. Although it could be possible to develop a tool, which incorporates the barriers and enablers identified in this study to support the future development of interventions, this research suggests there needs to be a more bespoke and tailored approach. Chapter 2 presented an operational framework to guide both researchers and practitioners in the development, implementation and evaluation of interventions [106]. As part of the intervention development process, the first step of this framework was identified as engaging with employees and managers in the target organisation to understand the barriers and enablers to sitting less. This framework highlights the importance of first gaining a clear understanding of both the nature and context of the target organisation's barriers and enablers to sitting less at work, as the initial phase of the intervention development process. The framework also advocates for the use of a participatory approach when developing and implementing interventions. A participatory approach could also be a key strategy to account for barriers and enablers present within different organisations and support the development of strategies to account for these issues. Furthermore, the findings from Phase 1 demonstrate that it is important to consider social ecological factors, particularly focusing on organisational culture, and the impacts that the broader social, economic and political context could have on different organisations, both which appear to have the greatest propensity for variation between organisations.

Strengths and limitations

There were a number of strengths to Phase 1. This was the first qualitative study to explore and compare the barriers and enablers to workplace sitting in different organisations in different economic sectors. The use of focus groups as the method of data collection was a strength as it enabled dynamic idea generation and in-depth discussions. Finally, including participants of a range of ages, educational attainment and job roles (including both staff and management) ensured that rich data were collected from a variety of different perspectives. The study offered further insight into barriers and enablers to sitting less at work in different organisational contexts, which should be considered when developing interventions.

Phase 1 had some limitations that should be noted. With the exception of the small business, only relatively small samples were taken to reflect the views of each organisation. Due to the convenience-based sampling methods, it was possible that the participants who volunteered were those already engaged or keen to address the issue of prolonged sitting in the workplace. Therefore, some additional barriers and enablers may not have been captured. However, as this study aimed to understand existing barriers and enablers to sitting less and not views on strategies to sit less, it was felt that participants would still be able to provide a good account of the present issues.

A common limitation attributed to qualitative research is the lack of generalisability of the findings [172]. This holds true when generalisability is considered through the traditional lens, i.e., statistical-probabilistic generalisability, sought through statistical sampling procedures, which aim to be representative and are associated with quantitative research methods [173]. However, in qualitative research there is also the need to consider other types of generalisability, e.g., naturalistic generalisability, transferability and analytical generalisability. Naturalistic generalisability occurs when “the research bears familial resemblances to the readers’ experiences, settings they move in, events they’ve observed or heard about, and people they have talked to” [173]. Transferability refers to the extent to which results are transferable to other settings, i.e., when the reader believes that the “research overlaps with their own situation and/or they can intuitively transfer the findings to their own action” [173]. Some of the broad themes from this research, particularly in relation to the nature of office-based work, social norms and organisational culture as barriers/enablers to sitting less at work, are consistent with findings from other research [160] and therefore have the potential to demonstrate naturalistic generalisability and/or transferability. Finally, analytical generalisability is where “the researcher generalises the results to an established concept or theory... so it is the concepts or theories that are generalisable not the specific context” [173]. Findings from this research could demonstrate analytical generalisability as the barriers and enablers reported were shown to be consistent with the multiple levels of influence of the ecological model of sedentary behaviour and hence, this theoretical framework could be used by other researchers when considering barriers and enablers associated with sitting less at work.

3.7. Conclusions

Phase 1 has demonstrated that there were many barriers and enablers that were consistent across organisations of different size and sector, particularly in relation to individual and internal physical environmental factors, which appear to be primarily linked to the constraints of office-based work. However, there were some key differences between the four organisations that are important for both researchers and practitioners to be aware of when developing and implementing strategies to support staff to sit less at work. These differences mainly related to organisational culture, organisation size, ways of working, the idea of presenteeism and the impact of the wider political and economic context. Public and voluntary sector organisations faced more constraints and bureaucracy due to higher levels of scrutiny and accountability compared to private sector organisations, which could have more freedom to innovate and make changes. Considering these issues thoroughly as part of the development of interventions to reduce workplace sitting is likely to influence the intervention effectiveness and promote external validity. Based on the findings of this phase of the project, developing an understanding of relevant organisational and wider contextual factors could be an important first step when developing such interventions.

Chapter 4: Phase 2 – Development of “Sit Less at Work” interventions and plans for implementation

4.1. Chapter summary

The operational framework outlined in Chapter 2 (see Figure 2.2) was used as the basis for the development of the interventions in the four participating organisations and the subsequent plans for implementation. The process included the following steps, as outlined by the operational framework: using a theoretical model (ecological model of sedentary behaviour) and participatory approaches (co-production); developing action plans (interventions); embedding the intervention within local strategies; and taking into account the real-world context. Furthermore, barriers and enablers identified in Chapter 3 were also addressed during the intervention development and implementation plans. Intervention development involved two workshops: Workshop 1 involved brainstorming creative ideas for sitting less at work; Workshop 2 refined the ideas from the initial workshop into a practical intervention. Both workshops were run in each of the four organisations with convenience samples of employees participating.

These workshops resulted in the production of four “Sit Less at Work” interventions, one for each participating organisation. The workshops were positively evaluated by volunteers. Plans for implementation were iteratively explored for three of the participating organisations. The large corporation opted out of the project at the implementation planning stage due to lack of interest from the staff.

Intervention content and implementation plans varied by organisation, which could be a reflection of the varying sizes and sectors of the organisations and differences in participant characteristics. The use of the ecological model of sedentary behaviour and co-production ensured that the interventions encompassed a range of strategies that targeted multiple levels of influence and were tailored to the needs of the staff in each organisation.

4.2. Background

Complex intervention development processes and decision-making are rarely reported in detail [174]. However, in order to understand “what”, “why”, “how” and “when” decisions were made, and thereby ensure intervention development processes can be replicated with fidelity, this detail is essential [174]. This chapter reports the intervention development processes and plans for implementation used in Phase 2.

4.2.1. Theoretical model

As highlighted in Chapter 2, a theoretical approach is recommended for the development of effective interventions [84]. However, there is currently no consensus regarding which theory is most appropriate for interventions aimed at reducing workplace sitting time. The use of ecological models have been advocated to address health behaviour change in research and practice [162]. These models encompass environmental and policy levels of influence, which distinguishes them from widely used behavioural models and theories, which focus on individual characteristics and social influences from family and friends [162]. In order to achieve and maintain significant positive changes in health behaviours, ecological models can be used to promote the use of individual, environmental and policy level changes [162]. Furthermore, it has been proposed that the purpose of using ecological models to change health behaviours is to support the development of comprehensive interventions, which target these multiple levels of influence [162].

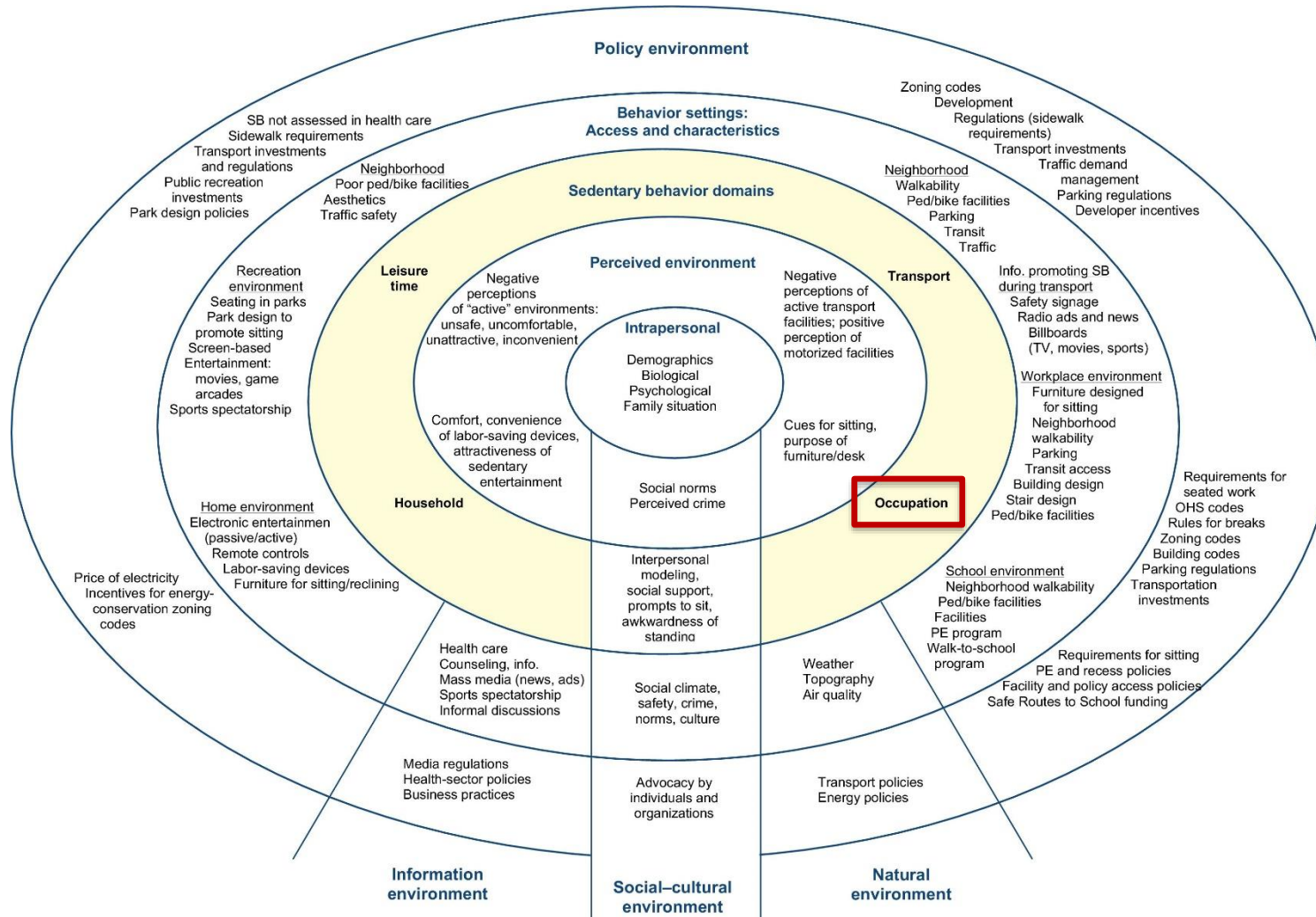
Ecological approaches are useful for addressing contextual factors, which could be important for specific settings, such as the workplace, since behaviours associated with a setting (e.g., sitting at work) have distinct determinants [161]. The attributes of the setting within which a behaviour occurs and the social frame around the setting is therefore likely to shape the behaviour [161]. Understanding the determinants of behaviours in a specific setting, such as sitting in the workplace, will support the development of more effective interventions. As such, an ecological model of sedentary behaviour has been proposed by Owen et al. [161] (see Figure 4.1). This model was adapted from an ecological model for physical activity [175] and demonstrates the specific and distinct influences of sedentary behaviour at multiple levels and in several domains. This model provides a behaviour-specific prompt to focus on the domains within which relevant contextual factors (environmental, social, organisational) influence certain sedentary behaviours.

The model identifies four different domains, namely: household, leisure-time, transport, and occupation. If the research specifies a certain domain, then the model highlights some key determinants linked to that domain, which should be considered during intervention development. For instance, when focusing on the “Occupational” domain (highlighted by a red box on Figure 4.1), the model identifies the possible determinants of sedentary behaviour (as seen in the bottom righthand quadrant of the model) at the levels of: the perceived environment (e.g., cues for sitting, purpose of furniture/desk); the behaviour setting, i.e., the workplace environment (e.g., furniture designed for sitting, building design); and the policy environment (e.g., requirements for seated work, occupational health and safety codes, rules for breaks). In addition, the following levels of influence are not necessarily domain-specific, but should also be considered as determinants of sedentary behaviour: intrapersonal factors (e.g., demographics, biology, psychology); the social-cultural environment (e.g., social norms, social support, culture); the natural environment (weather, energy policies); and the information environment (e.g., business practices, mass media). The determinants highlighted by the ecological model of sedentary behaviour are not exhaustive and indeed were determined

by research findings, but the model provides useful prompts to ensure a range of levels of influence are considered.

Since the publication of the ecological model of sedentary behaviour, ecological approaches have been used by other researchers when developing interventions to support staff to sit less at work [62, 64, 87, 133]. Furthermore, the barriers and enablers identified in Chapter 3 were consistent with an ecological approach and were identified to fall within four levels of influence: individual-level, organisational-level, the internal physical environment, and the broader social, economic and political context. These levels of influence broadly encompass the determinants outlined in the ecological model of sedentary behaviour. Taking an ecological approach to intervention development could, therefore, help to overcome barriers and maximise enablers identified in Chapter 3. Phase 2, therefore, utilised the ecological approach during the development of interventions to reduce workplace sitting time.

Figure 4.1. Ecological model of sedentary behaviour



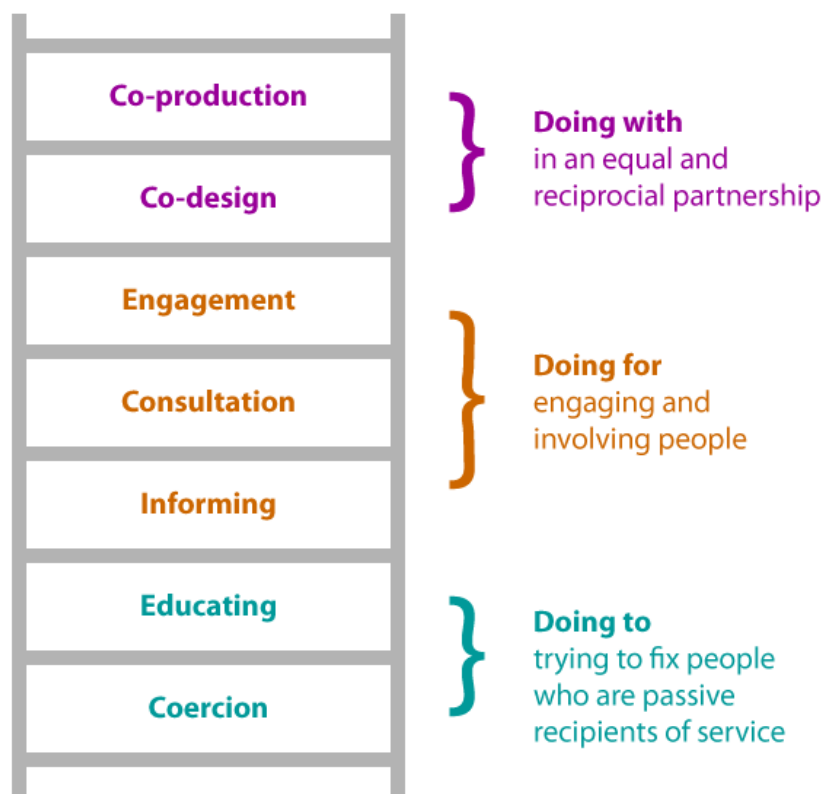
OHS, occupational health and safety; PE, physical education; Ped, pedestrian; SB, sedentary behaviour

Source: Owen et al. 2011. Adults' sedentary behaviour: determinants and interventions. *American Journal of Preventive Medicine*, 41(2), 189-96.

4.2.2. Participatory approach: Co-production

Medical Research Council (MRC) guidance for developing and evaluating complex interventions [84] recommends the inclusion of user involvement. The operational framework developed in Chapter 2 (see Figure 2.2) also highlighted the use of a participatory approach as a key step to intervention development and implementation. There are various levels of user involvement as demonstrated in Figure 4.2, the “ladder of co-production”. At the bottom of the ladder is the concept of “Doing to”, i.e., involving users but in a passive way using either coercion or education. In the middle of the ladder is the concept of “Doing for”, where users are more actively involved in the process by using techniques such as informing, consultation and engagement. Finally, at the top of the ladder is “Doing with”, where users are seen as partners and this incorporates both co-design and co-production.

Figure 4.2. The ladder of co-production



Source: Think Local Act Personal <https://www.thinklocalactpersonal.org.uk/co-production-in-commissioning-tool/co-production/In-more-detail/what-makes-co-production-different/>

Co-production, at the top of the ladder (see Figure 4.3), is different to techniques such as consultation and engagement, which simply ask users for their ideas and opinions and consequently treats them as passive recipients of services/interventions designed and delivered by someone else (e.g., researchers) [176]. Co-production emphasises that the end users of an intervention have assets and knowledge which can help to improve intervention effectiveness. Therefore, co-production needs users to play a more active role in developing and implementing their own interventions [177].

In relation to health, co-production is most commonly associated with healthcare/social care interventions or services, where patients or service users work with other key stakeholders to support the development of a new healthcare service or improvements to an existing service. Within this context, co-production has been defined as:

“A way of working whereby citizens and decision makers, or people who use services, family carers and service providers work together to create a decision or service which works for them all. The approach is value driven and built on the principle that those who use a service are best placed to help design it.” [178]

Co-production has been described as a “slippery concept”, which can be difficult to define in a way that encompasses all relevant contexts [179]. There is no one formula for co-production, but some key features that are common in co-production initiatives include: defining service users as assets with skills; breaking down barriers between service users and professionals, so power is shared more equally; building on people’s capabilities; and people working together to achieve shared interests [179]. Furthermore, there are several principles of co-production that are critical for putting co-production into action, such as [179]:

- Equality – the idea that everyone has assets (e.g., skills, abilities, time) and no one group or person is more important than any other
- Diversity – involving a diverse range of people and ensuring activities are inclusive for all
- Accessibility – the co-production process needs to be accessible to everyone ensuring everyone have the same opportunity to take part and includes physical access as well as accessible information (e.g., providing appropriate formats, consider use of jargon, language options), and time/timing
- Reciprocity – ensuring people receive something back for putting something in, which builds on people’s desire to feel needed and valued, and can be formal (e.g., rewards schemes) or informal (e.g., the development of positive relationships).

However, despite co-production being founded on these principles, there are no set procedures or methods for using co-production to develop interventions.

Co-production is being increasingly seen as a necessity for the development of complex public health interventions [180]. Public health interventions, defined as “planned actions to prevent or reduce a particular health problem, or the determinants of the problem, in a defined population”, are generally complex, aiming to target multiple levels of influence [180]. Developing such interventions in collaboration with key stakeholders/end users takes account of important contextual factors (e.g., needs, culture, preferences, resources), producing interventions that are: feasible, acceptable and sustainable; and have an increased chance of producing outputs that are translatable in the real-world, helping to address the ‘implementation gap’ [180, 181]. Furthermore, co-production can promote “buy-in” to the intervention, create a sense of ownership to those supporting the development, and ensure that the intervention content meets the needs of

the end users [182]. Such benefits of co-production are of particular interest when considering the development of interventions to reduce workplace sitting time.

As demonstrated in Chapter 3, there are important differences in barriers/enablers to reducing workplace sitting time between organisations, particularly in relation to organisational culture, organisation size, ways of working, the idea of presenteeism and the impact of the wider political and economic context. Using co-production techniques during intervention development and implementation could ensure these nuances are accounted for and hence support intervention effectiveness and promote external validity. Furthermore, the use of *participatory approaches* in the development of interventions to reduce workplace sitting time have been used in studies and advocated by researchers as a way of promoting ownership and staff buy-in, facilitating commitment to behaviour change, and ensuring the intervention is tailored to the specific needs of the organisation [64, 85–87]. However, the reporting of the *participatory approaches* involved in these studies was limited, providing only brief descriptions such as: asking participants to identify potential strategies [85], brainstorming ideas [64, 86, 87], undertaking consultation workshops [87], exploring potential feasibility and effectiveness of strategies and developing action plans [86]. There was only a brief mention of *co-production* in one of these papers [64], but no additional details were provided. Therefore, it is unclear if previous research involving the development of interventions to reduce workplace sitting has involved co-production techniques or not. This could be due to the lack of set procedures or methods for using co-production and the ambiguity that surrounds co-production in terms of its definition. Co-production could be happening, but simply not been defined as such and/or not being reported in enough detail.

Although there is limited evidence of the use of co-production in the development of interventions to reduce workplace sitting time, there are recent studies that have looked at co-production in relation to sedentary behaviour [183] and workplace health interventions [184]. Benefits of this approach were reported as: feelings of ownership and perceived ability to contribute resulting in a positive experience for participants [183], increased acceptability and uptake of the intervention [184], barriers being addressed and the facilitators of success identified [184].

A co-production approach was adopted in Phase 2 given the range of potential benefits for the development and implementation of interventions to reduce workplace sitting time, including: overcoming barriers to sitting less at work; tailoring strategies to meet the needs of a specific organisation; promoting buy-in; enhancing intervention acceptability, feasibility and sustainability; and supporting the translation of knowledge into practice.

4.3. Applying the operational framework to Phase 2

The operational framework produced in Chapter 2 (see Figure 2.2) identified key considerations for developing and implementing interventions to reduce workplace sitting time, which included:

- Engaging with employees to develop a clear understanding of the existing barriers and enablers to sitting less at work (presented in Chapter 3)
- Using a theoretical framework or model
- Using participatory or collaborative approaches (involving managers and employees)
- Developing and implementing action plans (interventions) which: are tailored to the needs of the employees and organisation; provide a menu of strategies; target multiple levels of influence; use workplace champions where appropriate; are low-cost; and consider both interrupting sitting time and replacing sitting with standing and moving
- Embedding the intervention in local policy and/or gaining high-level management support
- Taking into account real-world contextual factors
- Conducting a feasibility or pilot study within the target organisation (presented in Chapter 5).

The following sections report how the key considerations listed above were accounted for during Phase 2.

4.3.1. Theoretical model

Using the ecological model of sedentary behaviour, the current research focussed on the “Occupation” domain of the model (highlighted by a red box on Figure 4.1). The levels of influence were simplified into four key levels for the “Occupation” domain (based on findings from Phase 1): intrapersonal- (e.g., psychological and behavioural factors), interpersonal- (e.g., social support and addressing social norms), organisational- (e.g., local policies in workplaces, management involvement), and environmental-level factors (e.g., the workplace-built environment and the surrounding natural environment). This use of the ecological model of sedentary behaviour ensured all relevant determinants were considered.

4.3.2. Participatory approach

Co-production was selected to support the development and implementation of the interventions in Phase 2 for the reasons described in Section 4.2.2.

4.3.3. Developing and implementing interventions

By using the ecological model of sedentary behaviour and co-production techniques, the development and implementation of interventions inevitably involved many of the required elements identified by the operational framework (see Chapter 2, Figure 2.2) including:

- Being tailored to the needs of the employees and organisation

- Developing a menu of strategies to target multiple levels of influence
- Using workplace champions where appropriate
- Considering both interrupting sitting time and replacing sitting with standing and moving.

Furthermore, as the operational framework suggested that interventions needed to be low-cost, the purchase of new equipment, such as sit-stand desks or other ergonomic adaptations, was not encouraged. If organisations already had access to such equipment, then these could be made use of and if the organisation wished to purchase smaller, one-off pieces of equipment then this was permitted. No formal financial limitations were placed on organisations, as due to the pragmatic nature of this study, it was determined that organisations would decide for themselves what they deemed a “low-cost” intervention to be. However, the participating organisations were advised that the intervention need not require any form of financial investment in terms of the purchasing of equipment.

It was intended that the interventions would run for 12 weeks in each organisation. The 12-week intervention period was suggested by the public involvement panel (see Chapter 1, Section 1.5.1 for more details).

4.3.4. Embedding the intervention in local policy or gaining high-level management support

This consideration was supported by the use of the ecological approach and co-production techniques. This was achieved by exploring possible changes to policy to incorporate the issue of sitting less at work and how best to gain management buy-in during the co-production of the interventions when discussing organisational-level factors of influence.

4.3.5. Taking into account real-world contextual factors

Using an ecological approach and co-production to develop and implement the interventions allowed real-world contextual factors to be considered. The use of an ecological approach ensured that multiple levels of influence were explored, highlighting the complexity of the real-world problem [181]. Co-production helped to improve the feasibility of the intervention content, as those involved in the co-production process were employees of these organisations. In addition, co-production supported the translation of knowledge by providing the support required to change policy and/or practice in the real-world and foster context-specific decision-making [181].

Keeping the interventions low-cost ensured that financial barriers, an issue in many organisations in the current economic climate, were removed from the implementation of the interventions. Finally, researcher involvement in implementation was limited to ensure that implementation could be more easily replicated in real-world contexts. This limited involvement also ensured that the researcher was not part of the interventions, which would have increased the intervention costs.

4.4. Aims and objectives

The aims of Phase 2 were to:

1. Co-produce organisation-specific interventions
2. Plan the implementation of these interventions for each organisation.

The objectives of Phase 2 were to:

- a) Recruit staff volunteers from each participating organisation to be involved in the co-production of the interventions
- b) Run two workshops in each participating organisation with these volunteers – the first workshop involved developing creative ideas, the second workshop refined these ideas into an intervention
- c) Explore with the staff volunteers how best to implement their ideas within their workplace
- d) Gain feedback from participants regarding the running of the workshops in order to iteratively improve the workshops as they progressed
- e) Produce final interventions including plans for implementation
- f) Facilitate plans for implementation in each organisation and identify who within each organisation would be responsible for the implementation of the intervention.

4.5. Methods

Phase 2 was conducted between March and June 2018. Convenience samples of volunteers from each of the four participating organisations (see Chapter 3, Table 3.1 for characteristics of the participating organisations) were recruited via an email sent by the named contact in each organisation (see Appendix 6a for a copy of the recruitment email and participant information sheet). Both the email and participant information sheet were produced with the support of the public involvement panel (see Appendix 1d for a summary of the discussions from the third public involvement meeting held in September 2017).

All participants provided written informed consent (see Appendix 6b for a copy of the consent form) and data confidentiality and data protection measures were adhered to (see Appendix 4c for a copy of the ethics application detailing these measures). Ethical approval for this phase of the study was obtained from the School of Health and Related Research Ethics Committee at the University of Sheffield (ref no. 012219) (see Appendix 4d for a copy of the ethics approval letter).

The intervention development plans were informed by the public involvement panel (see Appendix 1d for a summary of the discussions from the third public involvement meeting held in September 2017) as well as the principles of co-production as outlined in Section 4.2.2. Key suggestions from the panel were to: host two one-

hour workshops; ensure the workshops were as active as possible (limiting opportunities for sitting and encouraging standing and moving around the room); establish some ground-rules to highlight that everyone's views were valued; ensure the workshops had a structure at the start of the session, but with some in-built flexibility so a range of ideas were elicited; and to allow participants to write down ideas first rather than speaking out to the group, as some participants might have felt more comfortable with that.

4.5.1. Workshop 1

The first workshop aimed to brainstorm initial ideas to help staff to sit less at work and used creative thinking activities to elicit ideas that were not constrained by cost or practicalities. Creative thinking activities were determined after discussion with a marketing expert who runs creative thinking workshops (a contact of one of the members of the public involvement panel). The first activity involved asking participants to consider different perspectives on how to sit less at work, in line with an ecological approach, and included considering: you as an individual; your team/colleagues; your employing organisation; and the workplace environment. The second activity was called "Provocative Operator" and required participants, in small groups of two to three, to list characteristics of a random word (selected from a page of random words, taken from Thinkertoys – a handbook of creative-thinking techniques, pg. 167 [185]) and then force links between these characteristics and sit less at work initiatives. This activity encouraged participants to think "outside of the box". See Appendix 7a for a detailed outline of this workshop and the activities. These activities were all conducted with participants standing and moving to different corners of the rooms to model the idea of sitting less at work.

Ideas gathered from Workshop 1 were then reviewed and categorised into four themes (which related back to the ecological approach):

1. What an individual could do
2. What you could do as a team or how your team/colleagues could support you
3. What the organisation could do
4. How the office environment could be changed

These ideas were then fed back to the participants from the first workshop to ensure that they were a fair reflection of the discussions. After some further refinement based on this feedback, the final list of ideas was brought to the second workshop.

4.5.2. Workshop 2

The second workshop allowed time and space to explore those ideas that participants felt were most feasible and suited to their organisation during a group discussion. In addition, specific barriers to implementation were identified by participants and by the primary researcher based on the findings from Phase 1 and ways to

overcome them were considered. Finally, plans for implementing each idea were explored by reviewing several questions, i.e., when should each idea be implemented during the 12-week intervention period, were any specific permissions required to action these ideas, who needed to be contacted, and who would take responsibility for these actions? The implementation plans were achieved by completing an “idea planning proforma”, which acted as a prompt to gain answers to aforementioned questions from the participants. See Appendix 7b for a detailed outline of this workshop and a worked example using the “idea planning proforma”.

At the end of both workshops, participants completed a brief questionnaire (see Appendix 7c), which provided basic demographic and work-related information, as well as open-ended responses relating to the planning and running of the workshops to gain feedback on the activities used and the contribution participants felt they made.

4.5.3. “Sit Less at Work” intervention development

After the second workshop, information gathered was put into a detailed action plan for each organisation. This included: a description of each action which made up the “Sit Less at Work” intervention; the timing and frequency of each action during the 12-week period; potential barriers to the actions and suggestions of how to overcome these; and who was to be responsible for implementing each action. An intervention summary document was also produced for each organisation, which identified the timings for each of the actions during the 12-week intervention period. Both of these documents were shared with the volunteers and their feedback was then incorporated into the final versions.

4.5.4. Implementation plans

For each participating organisation, senior management approval was obtained to conduct this project. However, implementation of the interventions needed to be an iterative process due to the varying types of participating organisations (in terms of size and sector) and the bespoke nature of the interventions.

4.6. Results

4.6.1. Intervention development

A total of 41 volunteers from the four organisations (n=7 in the small business, n=16 in the charity, n=15 in the local authority, and n=3 in the large corporation) initially expressed interest in participating in the workshops. Of those who expressed interest, 27 were able to attend the first workshops and 16 were able to attend the second workshops. Participant characteristics by organisation and by workshop are shown in Table 4.1. Due

to participant availability, some were able to participate in both Workshop 1 and 2, some were only able to participate in Workshop 1, and some were only able to participate in Workshop 2.

Table 4.1: Participant characteristics for workshops 1 and 2

| Characteristic | Small business | Charity | Local authority | Large corporation | Total |
|--|----------------|---------|-----------------|-------------------|-------|
| Total number of employees | 8 | 488 | 4,146 | 119,300* | - |
| Workshop 1 | | | | | |
| Total number of participants | 6 | 10 | 9 | 2 | 27 |
| Number of management-level participants | 3 | 2 | 2 | 2 | 9 |
| Mean age (years) | 32 | 37 | 46 | 42 | 39 |
| Female | 1 | 7 | 7 | 2 | 17 |
| Ethnicity | | | | | |
| - White British | 6 | 8 | 8 | 2 | 24 |
| - Other | 0 | 2 | 1 | 0 | 3 |
| Highest educational attainment | | | | | |
| - Degree or equivalent | 0 | 4 | 4 | 1 | 9 |
| - Higher education | 2 | 3 | 0 | 0 | 5 |
| - A level or equivalent | 2 | 0 | 2 | 0 | 4 |
| - GCSEs grade A*-C or equivalent | 1 | 2 | 0 | 0 | 3 |
| - No qualifications | 0 | 0 | 0 | 0 | 0 |
| - Other | 1 | 1 | 3 | 1 | 6 |
| Full-time | 5 | 7 | 8 | 2 | 22 |
| Self-report % workday sitting time | | | | | |
| - 0-25% | 0 | 0 | 0 | 0 | 0 |
| - 25-50% | 0 | 0 | 0 | 0 | 0 |
| - 50-75% | 1 | 0 | 5 | 2 | 8 |
| - 75-100% | 5 | 10 | 4 | 0 | 19 |
| Workshop 2 | | | | | |
| Total number of participants | 4 | 6 | 4 | 2 | 16 |
| Number of management-level participants | 3 | 0 | 2 | 2 | 7 |
| Mean age (years) | 37 | 30 | 50 | 42 | 40 |
| Female | 1 | 5 | 3 | 2 | 11 |
| Ethnicity | | | | | |
| White British | 4 | 6 | 4 | 2 | 16 |
| Other | 0 | 0 | 0 | 0 | 0 |
| Highest educational attainment | | | | | |
| Degree or equivalent | 0 | 4 | 3 | 1 | 8 |
| Higher education | 1 | 0 | 1 | 0 | 2 |
| A level or equivalent | 2 | 1 | 0 | 0 | 3 |

| | | | | | |
|---|----------|----------|----------|----------|-----------|
| GCSEs grade A*-C or equivalent | 0 | 1 | 0 | 0 | 1 |
| No qualifications | 0 | 0 | 0 | 0 | 0 |
| Other | 1 | 0 | 0 | 1 | 2 |
| Full-time | 3 | 5 | 3 | 2 | 13 |
| Self-report % workday sitting time | | | | | |
| 0-25% | 0 | 0 | 0 | 0 | 0 |
| 25-50% | 0 | 0 | 0 | 0 | 0 |
| 50-75% | 0 | 3 | 2 | 2 | 7 |
| 75-100% | 4 | 3 | 2 | 0 | 9 |

**Although there were 119,300 employees in total in the large corporation, the recruitment email only reached 25 members of staff who were based within the branch that had agreed to participate in the project.*

Table 4.1 demonstrates that the majority of participants in the workshops were well-educated, white British females who worked full-time and self-reported sitting at work for 75-100% of the time. However, there were some differences by organisation. For example, in the small business the majority of participants were younger males, and in the local authority, the participants had a higher average age than the other organisations.

The ideas elicited from participants in Workshop 1 presented by organisation and by level of influence are shown in Appendix 8. The ideas ranged from those that were easily feasible, e.g., encouraging staff to drink more water and go for lunchtime walks, to those that were not feasible at all either due to financial constraints, e.g., the purchase of sit-stand desks, or due to practical limitations, e.g., getting an electric shock if sat for too long. Table 4.2 highlights examples of the range of ideas from Workshop 1 for each organisation.

Table 4.2. Examples of outputs from Workshop 1 by organisation

| Small business | Charity | Local authority | Large corporation |
|---|---|---|---|
| Taking a lunch trip by foot/walking to the shops | To challenge yourself to move away from your desk for 10 minutes every hour | Using an application on your phone to prompt you to move from your desk regularly | Drink more water |
| Standing when on a phone call | Make your own drinks | Every hour, the whole team to stand and stretch for five minutes | Introduce “energisers” (periods of movement) into team meetings |
| Helping and supporting others to sit less | Set-up a lunchtime walking or cycling group | Set-up a community team who go out to litter pick | Set-up team challenges |
| Hold team competitions (e.g., ping pong, press-ups) | Hold team meetings stood up | Organisation to develop financial incentives to sit less at work | Get rewards or prizes for sitting less |

| | | | |
|--|---|---|--|
| Developing a policy for moving more; getting rewarded for sitting less | Celebrate changes to sitting time or sitting less achievements as an organisation | Have standing or walking meetings | Invest in stability balls and standing desks |
| Buying and using office dumbbells, exercise bikes, cross-trainers | Ban eating lunch at your desk | Invest in under-desk cycling pedals | |
| Moving to an office closer to green space | Investing in high tables to allow standing meetings | Set-up a walking route round the office | |

The outputs from the second workshops are shown in Tables 4.3 to 4.6. These tables describe the final “Sit Less at Work” interventions for each organisation. These were actions suggested by participants in Workshop 1 and deemed to be feasible and practical by participants in Workshop 2. For all the “Sit Less at Work” interventions, the actions were staggered over the 12-week period to ensure there were not too many during any one week. A detailed description of each of the actions by organisation, as well as associated barriers and plans to overcome them can be found in Appendix 9. For the small business, charity and local authority, there was at least one intrapersonal-, interpersonal-, organisational-, and environmental-level action identified. For the large corporation, a feasible environmental-level initiative was not suggested, despite prompting. The ecological level that each new action relates to is denoted in bold in each table using the following abbreviations: “Intra” (intrapersonal-level), “Inter” (interpersonal-level), “Org” (organisational-level), and “Env” (environmental-level).

Table 4.3 provides the intervention summary for the small business. There were two overarching actions that were intended to be on-going throughout the 12-week intervention period, which included the use of social media to promote the “Sit Less at Work” intervention externally, and to include the intervention as an agenda item in the team meetings, ensuring a health and wellbeing policy incorporating the intervention was developed. Individuals responsible for the implementation of each action were highlighted in bold (where the action first appears) on the intervention summary (MD to denote the Managing Director or two random letters to denote other members of staff).

Table 4.3. Small business 12-week “Sit Less at Work” intervention summary

Actions to be initiated at the start and to continue throughout the 12-weeks:

- Throughout: use of social media to promote sit less initiative – **TF and MD to oversee, but will delegate some responsibilities to other staff (Inter)**
- During the team meetings: Included the sit less initiative and develop a policy (working document) – **TF to action (Org)**

| Week | Action 1 | Action 2 | Action 3 | Action 4 | Action 5 | Action 6 |
|------|--|---|--|--|---|----------|
| 1 | Email from Managing Director (MD) to encourage and support staff – MD to send email (Org) | Take regular breaks using computer prompt – KE to develop pop-up and provides it to all who want it; all to action (Intra & Org) | Exercise ball instead of chair – 2-3 x weekly – NE to do rota for use of the ball for duration of 12 weeks; all to action as per rota (Env) | Do computer games competition which involves movement – KE to ensure all have access to the gaming systems / app, to encourage participation and to ensure all scored appropriately (Inter) | | |
| 2 | Email from MD to encourage and support staff | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Walk to shops for lunch / snacks – 2-3 x weekly – NE to ask who wants to be involved and then to write a rota for duration of 12 weeks; all to action as per rota (Intra & Org) | Exercises with office dumbbells – 2-3 x weekly – FH to lead the dumbbell sessions (Inter) | |
| 3 | Email from MD to encourage and support staff | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Do computer games competition which involves movement – prize awarded at end of week 3 | Use wireless headsets to allow walking whilst on the phone – MD to purchase and distribute to staff; all to action (Env) | |

| | | | | | | |
|----|--|---|---|--|--|--|
| 4 | Email from MD to encourage and support staff | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Walk to shops for lunch / snacks – 2-3 x weekly | Exercises with office dumbbells – 2-3 x weekly | Use wireless headsets to allow walking whilst on the phone |
| 5 | Email from MD to encourage and support staff | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Do ping pong competition – 2-3 x weekly – KE to ensure all scored appropriately (Inter) | Use wireless headsets to allow walking whilst on the phone | |
| 6 | Email from MD to encourage and support staff | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Walk to shops for lunch / snacks – 2-3 x weekly | Exercises with office dumbbells – 2-3 x weekly – | Use wireless headsets to allow walking whilst on the phone |
| 7 | Email from MD to encourage and support staff | Take regular breaks using computer | Exercise ball instead of chair – 2-3 x weekly | Do ping pong competition – 2-3 x weekly – prize awarded at end of week 7 | Use wireless headsets to allow walking whilst on the phone | |
| 8 | Email from MD to encourage and support staff | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Walk to shops for lunch / snacks – 2-3 x weekly | Exercises with office dumbbells – 2-3 x weekly | Use wireless headsets to allow walking whilst on the phone |
| 9 | Email from MD to encourage and support staff | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Do press-up competition – 2-3 x weekly – KE to ensure all scored appropriately (Inter) | Use wireless headsets to allow walking whilst on the phone | |
| 10 | Email from MD to encourage and support staff | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Walk to shops for lunch / snack – 2-3 x weekly | Exercises with office dumbbells – 2-3 x weekly | Use wireless headsets to allow walking whilst on the phone |

| | | | | | | |
|----|--|---|---|--|--|--|
| 11 | Email from MD to encourage and support staff – | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Do press-up competition – 2-3 x weekly – prize awarded at end of week 11 | Use wireless headsets to allow walking whilst on the phone | |
| 12 | Email from MD to encourage and support staff | Take regular breaks using computer prompt | Exercise ball instead of chair – 2-3 x weekly | Walk to shops for lunch / snacks – 2-3 x weekly | Exercises with office dumbbells – 2-3 x weekly | Use wireless headsets to allow walking whilst on the phone |

Table 4.4 shows the intervention summary for the charity. Three actions were planned to occur either at the start or throughout the 12-week intervention period, which included: sending initial communications to managers and to all staff informing them of the sit less intervention; holding any team meetings stood up or to incorporate standing or moving into meeting agendas throughout the 12 weeks; and developing changes in policies and guidelines to ensure sitting less at work was incorporated.

Table 4.4. Charity 12-week “Sit Less at Work” intervention summary

Actions to be initiated as appropriate at the start or throughout the 12-weeks:

- At the start: communications sent to managers and to all staff informing of the sit less initiative **(Org)**
- Hold any team meetings during this time stood-up or incorporate standing/moving into meeting agendas, or conduct standing/walking 1:1s **(Org)**
- Changes in policies and guidelines (working document) **(Org)**

| Week | Action 1 | Action 2 | Action 3 | Action 4 |
|------|--|---|----------|----------|
| 1 | Email from Chief Exec to encourage and support staff to take short, regular breaks (Intra & Org) | | | |
| 2 | Email from Chief Exec to encourage and support staff to take short, regular breaks | Personal targets for steps/day and track activity using FitBit/pedometers and record steps each day (Intra & Inter) | | |

| | | | | |
|----|--|---|--|---|
| 3 | Email from Chief Exec to encourage and support staff to take short, regular breaks | Celebrate changes/achievements – tell us your sit less stories (Inter & Org) | | |
| 4 | Email from Chief Exec to encourage and support staff to take short, regular breaks | Personal targets for steps/day and track activity using FitBit/pedometers and record steps each day | Lunchtime walking or running group (Inter) | |
| 5 | Celebrate changes/achievements – “tell us your sit less stories” | Lunchtime walking or running group | | |
| 6 | Email from Chief Exec to encourage and support staff to take short, regular breaks | Personal targets for steps/day and track activity using FitBit/pedometers and record steps each day | Lunchtime walking or running group | Clear office/desk policy (Intra, Org & Env) |
| 7 | Celebrate changes/achievements – “tell us your sit less stories” | Lunchtime walking or running group | Clear office/desk policy | |
| 8 | Email from Chief Exec to encourage and support staff to take short, regular breaks | Personal targets for steps/day and track activity using FitBit/pedometers and record steps each day | Lunchtime walking or running group | Clear office/desk policy |
| 9 | Celebrate changes/achievements – “tell us your sit less stories” | Lunchtime walking or running group | Clear office/desk policy | |
| 10 | Email from Chief Exec to encourage and support staff to take short, regular breaks | Personal targets for steps/day and track activity using FitBit/pedometers and record steps each day | Lunchtime walking or running group | Clear office/desk policy |
| 11 | Celebrate changes/achievements – “tell us your sit less stories” | Lunchtime walking or running group | Clear office/desk policy | |
| 12 | Email from Chief Exec to encourage and support staff to take short, regular breaks | Personal targets for steps/day and track activity using FitBit/pedometers and record steps each day | Lunchtime walking or running group | Clear office/desk policy |

Table 4.5 provides the intervention summary for the local authority. There were three overarching actions to begin and continue throughout the 12-week period, which included: holding team meetings stood-up or incorporate standing or moving into team meetings; including health and wellbeing and the issue of sitting less at work in one-to-one meetings held during this period; and including sitting less and moving more at work into workplace guidelines.

Table 4.5. Local authority 12-week “Sit Less at Work” intervention summary

Actions to be initiated at the start and to continue throughout the 12-weeks:

- Hold any team meetings over this 12-week period stood-up or incorporate standing/moving into these meetings **(Org)**
- Include improving health and wellbeing in 1:1s **(Org)**
- Include sitting less / moving more into workplace guidelines **(Org)**

| Week | Action 1 | Action 2 | Action 3 | Action 4 |
|------|---|--|--|---|
| 1 | Encourage staff to sit less / move more using Chief Exec’s weekly blog (Intra, Org & Env) | Team step competition – new competition begins (Inter) | | |
| 2 | Encourage staff to sit less / move more using Chief Exec’s weekly blog | Team step competition – on-going | | |
| 3 | Encourage staff to sit less / move more using Chief Exec’s weekly blog | Team step competition – on-going | Team standing breaks – whole team stands for 2-5 mins every hour (Inter) | |
| 4 | Encourage staff to sit less / move more using Chief Exec’s weekly blog | Team step competition – winner selected | Team standing breaks – whole team stands for 2-5 mins every hour | Message over tannoy to remind everyone to stand / move (Tuesday at 11.30am) (Org) |
| 5 | Encourage staff to sit less / move more using Chief Exec’s weekly blog | Team step competition – new competition begins | Team standing breaks – whole team stands for 2-5 mins every hour | Message over tannoy to remind everyone to stand / move (Tuesday at 11.30am) |

| | | | | |
|-----------|--|--|--|---|
| 6 | Encourage staff to sit less / move more using Chief Exec's weekly blog | Team step competition – on-going | Team standing breaks – whole team stands for 2-5 mins every hour | Message over tannoy to remind everyone to stand / move (Tuesday at 11.30am) |
| 7 | Encourage staff to sit less / move more using Chief Exec's weekly blog | Team step competition – on-going | Team standing breaks – whole team stands for 2-5 mins every hour | Message over tannoy to remind everyone to stand / move (Tuesday at 11.30am) |
| 8 | Encourage staff to sit less / move more using Chief Exec's weekly blog | Team step competition – winner selected | Team standing breaks – whole team stands for 2-5 mins every hour | Message over tannoy to remind everyone to stand / move (Tuesday at 11.30am) |
| 9 | Encourage staff to sit less / move more using Chief Exec's weekly blog | Team step competition – new competition begins | Team standing breaks – whole team stands for 2-5 mins every hour | Message over tannoy to remind everyone to stand / move (Tuesday at 11.30am) |
| 10 | Encourage staff to sit less / move more using Chief Exec's weekly blog | Team step competition – on-going | Team standing breaks – whole team stands for 2-5 mins every hour | Message over tannoy to remind everyone to stand / move (Tuesday at 11.30am) |
| 11 | Encourage staff to sit less / move more using Chief Exec's weekly blog | Team step competition – on-going | Team standing breaks – whole team stands for 2-5 mins every hour | Message over tannoy to remind everyone to stand / move (Tuesday at 11.30am) |
| 12 | Encourage staff to sit less / move more using Chief Exec's weekly blog | Team step competition – winner selected | Team standing breaks – whole team stands for 2-5 mins every hour | Message over tannoy to remind everyone to stand / move (Tuesday at 11.30am) |

Table 4.6 shows the intervention summary for the large corporation. Only three different actions were decided upon by participants in Workshop 2: weekly emails from Area Manager with sit less suggestions; weekly sit less challenges; and to incorporate activity/movement into the monthly team meetings. These planned actions were spread across the 12-week period.

Table 4.6. Large corporation 12-week “Sit Less at Work” intervention summary

| Week | Action 1 | Action 2 | Action 3 |
|------|---|---|---|
| 1 | Weekly email from Area Manager with sit less suggestions (Intra, Inter & Org) | | |
| 2 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge (Inter & Org) | |
| 3 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | |
| 4 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | Incorporate activity into monthly team meetings (Inter & Org) |
| 5 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | |
| 6 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | |
| 7 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | |
| 8 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | Incorporate activity into monthly team meetings |
| 9 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | |
| 10 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | |
| 11 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | |
| 12 | Weekly email from Area Manager with sit less suggestions | Weekly sit less challenge | Incorporate activity into monthly team meetings |

4.6.2. Plans for implementation

Implementation plans in the small business

As five of the eight members of staff from the small business, including the Managing Director (MD), were involved in the development of the intervention, determining implementation plans and deciding who was to action these plans was clear and straightforward. This allowed named individuals to be allocated different tasks in order to support the implementation of the intervention (highlighted as random letters in bold in Table 4.3). The MD was involved in all of these discussions and approved the plans prior to rolling out the intervention. Some of the actions suggested by staff did require equipment to be purchased, e.g., set of dumbbells, a couple of exercise balls and wireless headsets. The MD viewed these purchases as part of a low-cost investment, particularly when compared to the cost of investing in sit-stand desks for everyone, so agreed to approve these purchases. The ping pong table already existed and was the main conference table in the office. The primary researcher wrote template emails for the MD to send out to encourage and support staff to sit less at work (Action 1), which could be amended as appropriate (see Appendix 10a for copies of these communication templates).

Implementation plans in the charity

Three volunteers initially agreed to take the intervention forward and began to make some enquiries as to how to implement the various actions. However, these volunteers were unable to provide names of individuals to take on each of the actions. A member of staff in the Human Resources (HR) team, *Tom* (pseudonym), whose role included responsibility for the health and wellbeing of staff, was identified by the participants as a key individual to support the implementation. As *Tom* had not been involved in the workshops, the primary researcher met with him to explain the background and aims of the project and what actions the staff had decided upon. *Tom* then became the main point of contact and took on the responsibility for implementing the intervention (see Table 4.4). To support Action 1, “Weekly emails from the Chief Executive to encourage staff to take short breaks”, the primary researcher provided *Tom* with email templates which could be amended to suit the style of communications from the organisation as necessary (see Appendix 10a for copies of these communication templates).

Implementation plans in the local authority

Due to the size of the organisation, the volunteers felt unable to take on the specific actions, as they perceived themselves as lacking the influence required to get the intervention “off the ground”. The primary researcher, therefore, met with a member of the public health team within the local authority, *Deborah* (pseudonym), to ask for advice about how best to proceed. *Deborah* provided the primary researcher with contact details of key individuals within the organisation who she felt should be able to support the implementation phase. These included key members of the: HR and organisational development team, communications and

engagement team, and strategy and performance team. However, despite multiple emails to these contacts there was only one response. The primary researcher therefore re-contacted *Deborah* to again ask for advice. She recommended writing a briefing paper for the Director of Public Health to present at the next Directors meeting in order for the intervention to be formally approved (see Appendix 10b for briefing paper).

Once approval was obtained, the primary researcher was provided with a named contact within the HR Department, *Lucy* (pseudonym), who would take responsibility for implementation on behalf of the local authority. *Lucy* contacted the primary researcher to arrange an implementation meeting with herself, her manager, two members of the public health team and one of the volunteers from the intervention development group who was keen to remain involved in the implementation process. The primary researcher commenced the meeting with a brief presentation (see Appendix 10c), ensuring a shared understanding of the project. The intervention (see Table 4.5) was then reviewed to determine how each action could be successfully implemented. Action 4, “Message over tannoy to remind everyone to stand/move” was deemed not to be feasible by the implementation team due to concerns some staff could confuse this with the weekly fire alarm test and hence had the potential to cause health and safety issues. Therefore, this action was removed from the final plan.

It was decided that the implementation of the intervention would be led by *Lucy*. The primary researcher provided templates for the communications from the Chief Executive (see Appendix 10a for copies of these communication templates). *Lucy* had the responsibility of making appropriate plans for the implementation of each action as laid out in the intervention summary.

Implementation plans in the large corporation

The two volunteers who attended the workshops were keen to ensure the implementation of the “Sit Less at Work” intervention. However, they were reluctant to provide names of individuals to lead each of the actions who were not present at the workshops and did not feel able to commit themselves due to lack of capacity. In order to gain support for the intervention from colleagues, they discussed it at their team meeting. However, no other staff members were keen to be involved at that time. Three months later, the two volunteers highlighted the project again at their team meeting, but it was reported that there was still “no appetite” for the intervention amongst their colleagues and as such could not be implemented. This organisation, therefore, opted to no longer be involved in the project and no further plans for implementation were made.

4.6.3. Participant feedback on the workshops

Feedback was primarily positive from both workshops for all organisations (see Appendix 11 for detailed feedback). For example, regarding Workshop 1, some of the comments were as follows:

- “I felt very involved in what was being said. Being split into smaller groups helped this greatly” [participant from small business]
- “Very good – I liked the fact we were stood up! Good range of questions to consider and liked that no idea was too outrageous” [participant from charity]
- “[The workshop was] really fun and gave me lots of food for thought. Group size was about right” [participant from local authority]
- “[It was] interesting to think ‘outside-of-the-box’ of ways we could incorporate moving more into the working day” [participant from large corporation].

Examples of feedback from Workshop 2 included:

- “Helpful and insightful. It feels as if we made real progress.” [participant from small business]
- “I found the session to be interesting and quite focused; we addressed barriers but also what our quick wins would be” [participant from charity]
- “Very useful workshop. Would be good to see the ideas talked about actually happen. Anything that promotes a healthier working day has to be a good idea.” [participant from local authority]
- “Good to see what could actually implement into our team. The ideas we had will work if everyone gets on board. I think the challenge element will help” [participant from large corporation].

There were no negative comments, but there were some suggestions for improvements, which were addressed and incorporated into subsequent workshops where possible. For example, a participant from the charity organisation stated that the word association exercise in Workshop 1 (“Provocative Operator”) could have been clearer. Therefore, the primary researcher provided a worked example during subsequent workshops. There were also concerns raised that some of the suggestions would not be “possible or realistic” [participant from local authority]. Therefore, it was emphasised to participants that the reason for them not feeling constrained by practicalities was to allow ideas to develop that, although may not initially appear to be feasible, could be amended slightly to produce a feasible suggestion.

Some participants felt that it was not clear “who will take responsibility for implementing any of the suggested items” [participant from charity]. At the time of conducting the workshops, it was not known who would be responsible for implementation. It was anticipated that participants in the workshops would take the lead. This was achieved for the small business, but as explained above was not suitable for the other organisations. Nevertheless, participants were informed on the progress of the implementation plans after the workshops were completed.

4.7. Discussion

4.7.1. Intervention development

Four “Sit Less at Work” interventions, one for each participating organisation, were co-produced with a group of volunteer staff from each organisation using the operational framework (presented in Chapter 2, Figure 2.2) as a guide. Two workshops were held in each organisation to facilitate co-production. The first workshop encompassed a variety of creative-thinking activities and a theoretical approach (ecological model of sedentary behaviour) supported the structure of these activities, i.e., targeting and considering multiple levels of influence. The methods used in the first workshop ensured a range of ideas were suggested by participants. The second workshop provided an opportunity for these initial ideas to be refined into practical suggestions. The final “Sit Less at Work” interventions included action plans with detailed descriptions of each action, plans for implementation and how to overcome any potential barriers (see Appendix 9). The intervention summaries for each organisation provided an overview of the intervention over the 12-week period (see Tables 4.3 to 4.6).

The interventions produced by participants from the four organisations had a number of notable similarities. First, planned communications about the intervention were to come from a senior leader in the organisation to provide explicit “permission” for staff to participate. This was in line with previous studies that used co-production when developing interventions [61, 64] and also maximised an enabler identified in Phase 1, that management support could help encourage staff to sit less at work. Second, incorporating sitting less and moving more into health and wellbeing policies or guidelines was suggested by participants from the small business, charity and local authority, also with the aim of ensuring staff felt permitted to sit less. This action has been recommended as a means of supporting a shift in organisational culture [150], a barrier identified in Phase 1. Third, participants from the larger organisations (charity, local authority and large corporation) produced similar actions, which were also consistent with previous studies that used participatory approaches [64, 85, 122]. These suggestions (outlined fully in the detailed actions in Appendix 9) included: interrupting sitting time, e.g., by incorporating standing or moving into team meetings, drinking more water to prompt more breaks [64, 85]; replacing periods of sitting with activity, e.g., holding standing or walking meetings [64] or encouraging lunchtime walks or some other form of exercise [85]. Finally, monitoring step counts was also suggested by participants from all the larger organisations.

Although it is reassuring that multiple studies using participatory approaches have produced similar intervention strategies, it is not clear whether these strategies were themselves effective. A review of behaviour change strategies used in sedentary behaviour reduction interventions in adults by Gardner et al. [109], identified self-monitoring, problem solving, and restructuring the social or physical environment as the “most promising” behaviour change techniques. For interventions based in the workplace, the review also found that “very promising” interventions were associated with a primary aim of targeting sedentary

behaviour (as opposed to physical activity or other health promotion initiatives). The interventions developed for the four organisations all had the primary aim of encouraging and supporting staff to sit less at work. Furthermore, some of the actions suggested by workshop participants were in line with self-monitoring, e.g., developing personal targets for daily step counts, and restructuring the social environment, e.g., having competitions, celebrating sit less success stories, and having team standing breaks. Problem solving was incorporated during the development of the interventions by addressing barriers to implementation as part of Workshop 2. However, the interventions did not include suggestions of how to solve problems which occurred *during* the implementation period. Furthermore, restructuring the physical environment was only incorporated into the intervention for the small business, where exercise balls were to be used instead of office chairs. The charity and local authority did have environmental-level actions, but these were not “restructures”, rather they were utilising initiatives that were in place prior to the start of this intervention, e.g., the promotion of the clear desk/office policy (charity), and the use of standing desks (local authority). The large corporation did not incorporate any environmental-level action. Other studies that have used participatory approaches [61, 64, 85, 122] also used some, but not all, of the “very promising” behaviour change techniques identified by Gardner et al. [109], but demonstrated mixed effectiveness. Nevertheless, as explored in Chapter 2, it may not be the intervention content or use of specific behaviour change techniques that is important, but rather the process of developing and implementing interventions that could determine their success.

There were some notable differences in the “Sit Less at Work” interventions across the four organisations. In particular, participants from the small business produced suggestions that were more innovative, compared to the other organisations, such as: installing software onto their computers to remind them to regularly get up and move; incorporating a range of competition elements into the intervention, e.g., ping pong, press-ups, and computer games, which incorporated movement; using an exercise ball to sit on rather than a standard chair; doing some gym-style exercises with a set of office dumbbells; setting up a rota for staff to take it in turns to walk to get lunch for the team; purchasing and using wireless headsets to allow staff to move around when on the phone; and using social media to promote their positive health and wellbeing actions. Furthermore, except for the use of computer prompts [64, 85, 123], these actions were also quite different to interventions in previous studies.

The reasons that the small business was so distinct in terms of the intervention content could be related to the size and sector of this organisation and/or the gender and average age of the staff. Being such a small organisation in the private sector meant that it was simple to develop and plan the implementation of innovative actions and purchase small amounts of low-cost equipment without levels of bureaucracy, which has been identified as a barrier for larger organisations [186, 187]. In addition, as most of the staff involved in the development process were young males, this led to the inclusion of more “male-oriented” actions, which encompass a level of competitiveness [188, 189], e.g., press-up competitions and the use of computer games.

The larger organisations suggested more conservative ideas, e.g., step competitions, going to find colleagues to speak to rather than emailing. Participants from these larger organisations had a clear understanding of some of the broader barriers to implementation, such as the bureaucracy related to health and safety and equality and diversity policies, which were more easily overcome in the small business.

4.7.2. Plans for implementation

Prior to commencing this project, there were no formal plans for implementation. It was anticipated that implementation would be an iterative and pragmatic process, dependent on the needs of each organisation. Furthermore, planning such interventions too far in advance could have resulted in difficulties particularly in terms of staff attrition and turnover. Therefore, the implementation plans were developed as this phase of the project progressed.

Plans for the implementation of the “Sit Less at Work” interventions were supported by engaging management and gaining their commitment for the intervention. This has been highlighted as important by other studies [62, 64, 87, 117, 133, 135] and was also identified as a key step in the operational framework (see Chapter 2, Figure 2.2) and as an enabler in Phase 1 (see Chapter 3). Senior management approval for the project was sought and obtained from all participating organisations. However, the degree to which senior management were involved in the implementation plans varied by organisation. For the small business, there was direct involvement from the MD during all stages of Phase 2. He was present during the intervention development workshops and fully supported the implementation, allocating himself specific actions to take on, e.g., sending weekly emails to staff and encouraging the use of social media to promote the “Sit less at Work” intervention.

For the charity and local authority, the implementation process was more complex. Although approval for the project had been obtained from the organisations’ Chief Executives, due to capacity commitments, they were unable to be directly involved in the implementation plans. Therefore, they had to delegate this responsibility to appropriate members of staff. This was consistent with a previous study where managers from relevant departments were used to facilitate the logistics of implementing an intervention [117]. For the charity, a member of the HR team was nominated to be the responsible for taking the project forward. For the local authority, the primary researcher had to gain formal approval for the intervention to proceed from the Directors. Once approval was granted and the primary researcher was provided with a contact with specific responsibilities to take on this project, implementation plans could then move forwards. The reason the implementation process was more complex in the charity and local authority could have been due to the larger sizes of these organisations. As organisation size increases, so does organisational complexity and formalisation [190] increasing the levels of bureaucracy and making it harder for leaders to achieve the desired levels of commitment [187].

The large corporation dropped out at the point of planning implementation. As no further formal data were collected on the reasons for dropping out, it was difficult to fully understand why the staff were no longer willing to participate. There were a number of possible explanations for why the large corporation chose to no longer participate. First, although the team leaders had approved the project, they had delegated the responsibility for participation to more junior staff who had no capacity for implementing the intervention, so there was no good evidence of high-level commitment demonstrated to the staff. This lack of senior support and subsequent disengagement from the project highlights the importance of management buy-in. Second, the workshop volunteers presented the intervention at their monthly team meetings, but other staff were reportedly under too much pressure to commit to the project and had no interest in it. Finally, there were only two volunteers involved in the intervention development workshops. If there had been more interest during the development phase, then it might have been easier to gain buy-in from the rest of the staff. It would also have meant that the suggestions put forward were more representative of the ideas from the staff and hence might have been more acceptable to other staff.

4.7.3. Feedback on the co-production approach

Feedback from volunteers on the co-production approach was generally very positive, but there were some useful suggestions which were included in subsequent workshops. The feedback suggested that the process of co-producing interventions was perceived by participants in the workshops to be successful. Therefore, the activities used in the workshops in this study could be considered as part of the co-production of future interventions in research and in practice where organisations want to develop their own initiatives.

4.7.4. The benefits and weaknesses of co-production

Using co-production allowed for the development of bespoke “Sit Less at Work” interventions that were tailored to the needs of staff in each organisation and maximised the potential feasibility and acceptability. Co-production also helped to ensure that the interventions were appropriate for the different organisational contexts. Furthermore, co-production is known to encourage “buy-in” from other members of staff as there is a sense of ownership given the intervention was developed by colleagues/peers [182] rather than an “outsider” (researcher) who may not be perceived to have the insights required to develop an intervention suitable for the organisation.

There are several noteworthy weaknesses to co-production. First, co-producing an intervention can be time-consuming, as, by its very nature, it is an iterative process and it is not clear at the outset how long the process will take to complete [182]. This was not a particular issue in the current research, as staff volunteers were recruited easily. However, planning implementation did, in some cases (particularly the local authority), require more time and effort to access the decision-makers. Second, the iterative nature of co-production can mean that it is difficult to know when the intervention is finalised, which can be a threat to intervention

fidelity [182]. This occurred with the local authority in the current research, as, despite the intervention being finalised by the staff volunteers, those involved in the implementation plans vetoed one of the suggestions. Furthermore, as the organisations implemented the interventions themselves with limited input from the primary researcher, there was no guarantee that the interventions would be implemented as originally intended, further threatening intervention fidelity. This is why it was important to undertake a process evaluation, which is reported in Chapter 5, in order to determine intervention fidelity. Finally, due to the nature of co-production, the ideas that are developed by participants may not fit within an a priori behavioural theory and hence cannot be easily categorised and shown to be in line with such theories. This could explain why the ideas produced in the current research only touched upon some of the “very promising” behaviour change techniques identified by Gardner et al. [109]. Nevertheless, an ecological approach was taken to intervention development to overcome this potential issue. The use of an ecological approach ensured that the interventions developed were not constrained by behaviour change theories, which primarily focus on individual characteristics and miss the broader influences from communities, organisations, and policies.

Co-production has been used in other studies to develop interventions to reduce workplace sitting time [64, 85–87]. However, it is unclear if the use of co-production results in more effective interventions (see Chapter 2). Taking a “top-down”, researcher-led, evidence-based approach to intervention development, could be less time consuming and have limited threats to intervention fidelity and internal validity. However, this mechanism lacks creativity and the ability to tailor to the needs of staff and/or an organisation, which is important when considering translating this process into different organisational contexts and real-world settings and maximising external validity. It could be that a combination of the two approaches could be utilised in future. For instance, the “very promising” behaviour change techniques are described to participants involved in co-production, but how these behaviour change techniques are operationalised, in terms of the actual content and implementation, is determined via methods of co-production.

4.7.5. Strengths and limitations

There were a number of strengths to this phase of the project. First, the use of a theoretical model is in line with the existing evidence-base [84]. It ensured that theoretically sound interventions were developed which considered a range of behaviour determinants across multiple levels of influence. Second, the use of co-production techniques ensured that interventions were tailored to the needs of staff and their organisation, were feasible and acceptable to staff volunteers, and supported participant engagement with the intervention. Third, the feedback received from the co-production process was very positive, demonstrating the process was feasible and supported by the volunteers from all four organisations. Finally, allowing the organisations to implement the interventions themselves, with limited input from the primary researcher, more easily supports the translation of the findings into real-world settings and enhances external validity.

There were also a number of limitations to this phase of the project. First, the small number of volunteers and the fact the volunteers were obtained using convenience sampling techniques was likely to have impacted the representativeness of the volunteers. Further, it was possible that those that did self-select were those interested in the issues of physical activity and sedentary behaviour. To try to address this issue, the recruitment email emphasised that anyone could volunteer regardless of how physically active participants deemed themselves to be. Second, many suggestions from Workshop 1 involved ergonomic adaptations, which were not a feasible part of the project due to the focus on developing low-cost interventions (with no requirement to purchase additional equipment). This was as a result of the initial workshop involving the production of ideas no matter how costly or infeasible. However, participants were aware of this limitation as it was highlighted during both workshops that the focus was on developing a low-cost intervention. Finally, one suggestion by the volunteers in the local authority was vetoed by the staff involved in the implementation due to concerns over health and safety. This was of some concern as it could have affected the relationships built with the staff volunteers. However, the primary researcher made contact with these volunteers and explained the situation and all those who responded agreed that the suggestion to remove this action seemed reasonable.

4.8. Conclusions

Phase 2 resulted in the co-production of four “Sit Less at Work” interventions supported by an ecological approach, determining that, in general, co-production was a feasible method for developing such interventions. Plans for implementation were made for three of the participating organisations, with the final organisation (the large corporation) dropping out of the project at this stage. The use of co-production techniques and an ecological approach to guide the discussions in Workshop 1 ensured that the interventions developed in Workshop 2 encompassed a range of strategies that targeted multiple levels of influence and were tailored to the needs of the staff in each organisation. This chapter has provided a detailed description of not only what was developed, but also why, how and when decisions were made. These interventions were rolled out in each of the remaining three organisations and underwent process and outcome evaluations, which is reported in Chapter 5.

Chapter 5: Phase 3 – Process and outcome evaluation of the “Sit Less at Work” interventions

5.1. Chapter summary

The evaluation of the “Sit Less at Work” interventions involved both a process and outcome evaluation using a mixed-methods “before and after” feasibility study. Outcome data were collected at baseline, during the final week of the 12-week intervention and three months post-intervention. The primary outcome was change in workplace sitting time and this was collected objectively using activPAL3 devices. Process evaluation data collected included: participation and drop-out numbers; awareness of intervention and its various elements; and safety and adverse events. In addition, qualitative feedback was gained from participants, intervention implementers and key personnel in the organisations in relation to: intervention fidelity; intervention satisfaction and suggested improvements; contextual factors; sustainability of intervention components; and outcome measure acceptability.

There was no consistent reduction in workplace sitting time in any of the three participating organisations, suggesting that the “Sit Less at Work” interventions were not effective. However, the process evaluation identified that none of the interventions were implemented as originally intended, so the effectiveness of these interventions was not fully tested. There was a range of reasons provided for the lack of intervention fidelity, which primarily related to contextual barriers. For example, workload pressures and the social norms of sitting were identified by participants from all three organisations as barriers to sitting less at work. In the small business, an additional barrier related to staff turnover. In the charity and the local authority, additional barriers primarily related to issues with planned communications and competing priorities. Furthermore, key personnel from the local authority reported that more responsibility should be placed on the individual to change behaviour when it comes to health and wellbeing rather than the emphasis being placed on the organisation.

The overarching finding from Phase 3 related to the prevailing culture of an organisation that can promote existing social norms, which, in turn, can hinder the implementation of workplace sitting interventions. The evidence that sitting is a social practice influenced by the organisational culture suggests that further understanding of social barriers to sitting less at work is needed. Changes to organisational culture could be required prior to intervention development and implementation in order to support successful implementation.

5.2. Background

The operational framework produced in Chapter 2 (see Figure 2.2) suggested that the evaluation of interventions to reduce workplace sitting should encompass, and report on, both process and outcome evaluations. Outcome evaluations alone can leave many questions unanswered such as, if an intervention is effective in one context will it be effective in another; or if the intervention is ineffective, is this as a result of the intervention itself or due to poor implementation [81]? Process evaluation helps to explain how and why interventions may or may not have worked, what actually happened and how people felt about the intervention [84, 191]. Furthermore, assessing how an intervention was implemented [192, 193] can provide important information to policymakers and practitioners about how to replicate the intervention and what generalisable knowledge can be drawn from the implementation [80, 81]. Conducting a detailed process evaluation, with high methodological rigor, is also recommended by the MRC [80, 84]. However, as highlighted in the integrative review presented in Chapter 2, none of the included studies explicitly mentioned the use of process evaluation, although it was undertaken to some degree in seven of the studies [61, 64, 92, 120, 124, 131, 135]. In these studies, process evaluation either encompassed an assessment of intervention feasibility and acceptability and/or a determination of intervention fidelity. It is unclear if process evaluations are not being undertaken or are being undertaken but not published for others to learn from. Nevertheless, there is a gap in the published literature regarding the undertaking of process evaluations prior to larger-scale roll-outs of interventions to reduce workplace sitting. Phase 3 sought to address this gap in the literature.

The operational framework suggested a range of measures be assessed as part of a process evaluation for interventions to reduce workplace sitting including: intervention feasibility and acceptability; intervention fidelity; harms or unintended consequences; and the potential mechanisms of change. Furthermore, the importance of understanding contextual factors to underpin the development, implementation and evaluation of interventions to reduce workplace sitting time was highlighted in the operational framework. It is this understanding of contextual factors, such as organisation size and sector, and the influence they could have on intervention implementation and effectiveness that will support knowledge translation. There is no single best way to design and carry out a process evaluation; instead, the decision on which process evaluation framework to use should be determined by the research aims [194]. Bauman and Nutbeam's process evaluation framework, grounded in health promotion research, brings together a broad range of methods and measurements, including [191]:

- Exposure – did participants receive the intervention, were they aware of the intervention?
- Participation – how well were participants recruited to the intervention, what were the participation rates?
- Delivery – was the intervention delivered as intended (intervention fidelity)?

- Intervention satisfaction and usage – what was the extent to which participants used the resources/participated in the intervention, did they find it useful/relevant to their needs?
- Context – why was the intervention implemented as it was, what were the contextual influences that impacted intervention implementation?

Bauman and Nutbeam’s framework [191] places emphasis on the contextual influences, which aligns with the overall aim of the PhD research programme, so this framework was used as the basis for the process evaluation in Phase 3. In contrast, other similar process evaluation frameworks, such as the RE-AIM framework [195], do not highlight the need to assess contextual factors important for intervention implementation.

As part of the outcome evaluation, the operational framework identified a range of outcomes which should be assessed, such as: sitting, standing and moving time (within and outside of the workplace); physical and mental health measures; work-related measures, e.g., productivity, concentration and energy levels; socio-environmental or cultural changes; employee morale and autonomy; and long-term cost-effectiveness or return on investment. The purpose of assessing outcomes as part of Phase 3 (particularly the primary outcome of workplace sitting time) was to provide an indication as to whether the interventions could be effective in encouraging staff to sit less at work.

Having a clear understanding of both process and outcomes is key to determining if there is scope for a future larger scale roll-out of similar interventions in other settings or contexts and aids knowledge translation of research into practice [196]. As an initial step towards a larger trial, Phase 3 involved a process and outcome evaluation as part of a feasibility study and sought to establish what effect organisation size and sector could have on the implementation and evaluation of the three co-produced “Sit Less at Work” interventions.

5.3. Aims and objectives

The primary aim of Phase 3 was to understand if the implementation and evaluation of the three “Sit Less at Work” interventions was feasible.

Secondary aims were to:

1. Determine whether the interventions were implemented as intended, and the impact context had on implementation
2. Determine if the interventions were effective.

Objectives of Phase 3 were to:

- a) Recruit participants to this phase of the project

- b) Allow organisations to implement their “Sit Less at Work” intervention with limited researcher involvement
- c) Obtain objective and subjective data conducted at three separate time points as part of the process and outcome evaluations – at baseline (T0), in the final week of the intervention (T1), and three months after the intervention (T2) relating to: demographics, lifestyle factors, sitting time and physical activity (both objective and subjective measures); general health and wellbeing; sickness absence, productivity and presenteeism; response rates and drop-outs; awareness of intervention and the various elements; safety and adverse events
- d) Conduct focus groups after the intervention with participants as part of the process evaluation
- e) Conduct focus groups/interviews with intervention implementers to determine whether the intervention was implemented as intended as part of the process evaluation
- f) Carry out interviews with key personnel within each organisation (e.g., human resources (HR), occupational health, managing directors/chief executives) to understand their thoughts on the implementation and wider impact of the intervention on their staff and the organisation itself as part of the process evaluation
- g) Analyse quantitative and qualitative data
- h) Compare and contrast the findings by organisation to determine similarities and differences in process and outcome evaluation.

5.4. Methods

Phase 3 was conducted between September 2018 and May 2019 and utilised a mixed-methods “before and after” feasibility study design. A RCT design was not used as, due to issues with data protection, it was not possible to access a list of all employees in each of the participating organisations to undertake the randomisation process. However, the “before and after” intervention study design was appropriate to address the main aim of Phase 3, namely to assess the feasibility of implementing and evaluating the interventions. Further, it was intended that the findings from this study would potentially inform a future RCT, so was the first step towards such a study. The mixed-methods approach enabled a more in-depth assessment of whether the interventions worked, in which circumstances and for whom.

There were three participating organisations involved in Phase 3: a small business, a charity and a local authority (see Chapter 3, Table 3.1 for characteristics of the participating organisations). Volunteers from each organisation co-produced their own “Sit Less at Work” intervention (see Chapter 4, Tables 4.3 to 4.5 for intervention content). It was these co-produced interventions that were tested.

5.4.1. Participant recruitment

There were three parts to the Phase 3 recruitment:

1. Convenience samples of participants were recruited from each participating organisation to take part in the “before and after” intervention measures. A recruitment email along with the participant information sheet and project timeline was sent to the named contact within each of the three participating organisations. Each contact then arranged for the email to be sent to relevant (i.e., office-based) staff within their organisation. Interested participants were then asked to contact the primary researcher directly to allow an eligibility check to take place (ensuring they met the inclusion criteria described below) prior to formally enrolling them in the study.
2. Convenience sampling was also used to recruit to the post-intervention focus groups. Staff who participated in the “before and after” intervention measures, were asked to take part in the focus groups via a recruitment email sent from the primary researcher.
3. Purposeful sampling was used to recruit intervention implementers and key personnel (e.g., HR, occupational health, managing directors/chief executives) for focus groups/interviews. In the small business, those involved in the intervention implementation were also participants in the “before and after” intervention measures part of the study, so a single focus group was conducted for them which focused on both their experiences as a participant in the intervention and as implementers. For the charity and local authority, the named contacts were the implementers, so the primary researcher sent recruitment emails to those individuals directly. The key personnel in the small business was the MD only, and the primary researcher was able to contact him directly to participate in an interview. For the charity and local authority, appropriate key personnel were identified by the intervention implementers who passed on the contact details so that the primary researcher could recruit them directly.

All recruitment emails and participant information sheets were produced with the support of the public involvement panel. See Appendix 12 for a copy of each of the recruitment emails and participant information sheets and see Appendix 1d for a summary of the discussions from the fourth public involvement meeting held in June 2018 which relates to the development of the recruitment emails and participant information sheets.

All participants provided written informed consent (see Appendix 13a for a copy of the consent forms) and data confidentiality and data protection measures were adhered to (see Appendix 13b for a copy of the ethics application detailing these measures). Ethical approval for this phase of the study was obtained from the School of Health and Related Research Ethics Committee at the University of Sheffield (ref no. 019368) (see Appendix 13c for a copy of the ethics approval letter).

5.4.2. Inclusion and exclusion criteria

For the “before and after” intervention measures part of the study, potential participants (employees and

managers) needed to fulfil the following criteria:

- Be 18 years or older
- Work in one of the three participating organisations
- Be employed in a sedentary job, e.g., administration, customer service, helpdesk professions, call-centre workers, receptionists, managers
- Be available during the pre- and post-intervention data collection periods
- Not be pregnant nor have any limitation/disability that could prevent short periods of standing/moving, as the intervention will encourage standing/moving as an alternative to sitting.

5.4.3. Procedures

All eligible “before and after” intervention participants were invited to attend a brief information session held in their workplaces. This session was led by the primary researcher and involved a further explanation of the project, what participant involvement entailed, and a demonstration with the activPAL3 device (the inclinometer device used to collect objective sitting time data) including how to attach it to the thigh and how to complete the associated logbook (see Appendix 14 for a copy of the logbook (adapted from supplementary file 3 [197]) and information sheet adapted from supplementary file 2 [197]) that participants were provided). There was also an opportunity for participants to ask questions about the project.

One week prior to the start of the intervention, the “before and after” intervention participants undertook the baseline round of data collection (T0). The interventions were then rolled out over a 12-week period. During the final week of the intervention, a second round of data collection was conducted (T1). Three months post-intervention marked the final round of data collection (T2). Each round of data collection involved wearing the activPAL3 device for seven days and completing a questionnaire (see Section 5.4.4 for details).

It was the responsibility of each participating organisation to implement their own intervention. For the small business, individual staff members had been assigned actions to implement the intervention. In the charity and local authority, the implementation was the responsibility of the named contacts (*Tom (pseudonym)* in the charity and *Lucy (pseudonym)* in the local authority). The primary researcher was available for guidance if needed. However, as advised by the public involvement panel, contact was made with the implementers in each participating organisation every four weeks during the roll-out to enquire if any additional support was required (see Appendix 1d for a summary of the discussions relating to the plans for Phase 3 from the fourth public involvement meeting held in June 2018).

Four-to-six weeks post-intervention, focus groups and interviews were carried out with a sub-group of the “before and after” intervention participants, the intervention implementers and key personnel.

5.4.4. Data collection – process data

Quantitative data relating to the process evaluation were collected primarily at T1 and T2 and included:

- Participation (collected at T0, T1 and T2) and drop-out numbers
- Awareness of intervention and its various elements using post-intervention online questionnaires (see Appendix 15)
- Safety and adverse events reporting were encouraged throughout the running of the intervention and a specific question relating to this was included in the post-intervention online questionnaires (see Appendix 15).

Qualitative data were collected from intervention participants, intervention implementers and key personnel in the organisations to gain a range of different experiences and perspectives on the implementation and content of the interventions [81]. All participants involved in the qualitative data collection process completed a questionnaire, which included some basic demographic information and details of job position (see Appendix 16).

All questionnaires used in Phase 3 were developed with support from the public involvement panel. See Appendix 1d for a summary of the discussions from the fourth public involvement meeting held in June 2018 where advice was provided from the panel in relation to the format and language used in these questionnaires.

Focus groups were conducted in each organisation with a sub-group of the “before and after” intervention participants within four-to-six weeks of the intervention ending. A focus group methodology was used to encourage dynamic idea generation amongst the group, leading to an in-depth discussion and the collection of rich data [28]. Focus groups lasted 30-60 minutes. Issues relating to participants’ perceptions of the intervention and the outcome measures used were discussed using a semi-structured topic guide to explore six key dimensions (see Appendix 17 for a copy of the topic guide):

1. General perceptions of the intervention as a whole
2. The feasibility of the various elements of the intervention and outcome measures
3. The acceptability of the various elements of the intervention and outcome measures
4. Elements of the intervention that did/did not work
5. Suggested improvements to the intervention
6. The elements or behaviour changes have remained since the end of the intervention.

In the small business, as the participants in the “before and after” intervention measures were also the intervention implementers, a combined focus group was conducted, which explored their perceptions of the intervention as outlined above and also their thoughts about how the intervention was implemented (see

Appendix 17 for a copy of the combined topic guide). In the charity and local authority, semi-structured interviews were conducted with the intervention implementers. Interviews were selected as an appropriate method here as there was only one implementer in each of the organisations and there was a need to explore their individual experiences in some depth [81]. This part of the study explored four key dimensions (see Appendix 17 for a copy of the topic guide):

1. General perceptions about the intervention
2. The implementation of the intervention
3. Intervention fidelity
4. Barriers and enablers to intervention implementation.

Interviews were also conducted with key personnel in each organisation to understand their thoughts on the implementation and impact of the intervention on their staff and organisation more broadly. Interviews or joint interviews (involving two participants) were used for pragmatic reasons as only one or two key personnel from each organisation were recruited. These interviews were also semi-structured and explored their perspectives on five key dimensions (see Appendix 17 for a copy of the topic guide):

1. General perceptions about the intervention
2. The implementation of the intervention
3. The feasibility and acceptability of the intervention
4. Barriers and enablers to intervention implementation
5. Impacts and sustainability of the intervention.

All topic guides were pilot-tested during their first use, but no further amendments were necessary. All focus groups and interviews were audio-recorded and transcribed verbatim.

All topic guides used in Phase 3 were developed with support from the public involvement panel. See Appendix 1d for a summary of the discussions from the fifth public involvement meeting held in October 2018 where ideas were generated for topics to cover during the focus groups/interviews.

5.4.5. Data collection – outcome measures

Gaining an objective measure of sitting time was identified in the integrative review presented in Chapter 2 and by Chau et al. [71] as an important factor in reducing recall/reporting bias. In order to achieve this, activPAL3 devices were used. The activPAL devices have been identified as the most appropriate tool available to objectively measure sitting time and distinguish between sitting, standing and stepping time, with excellent correlation and agreement with direct observation for sitting and lying time [70, 198–200].

Data collected at T0 *only* included: demographic information (age, gender, postcode, ethnicity, education, job title and a brief description); lifestyle factors (body mass index, smoking, diet, alcohol consumption based on

items from the NHS New Patient Health Questionnaire); and physical activity levels (using items derived from the International Physical Activity Questionnaire (IPAQ) [201]).

Data collected at T0, T1 and T2 included:

1. Primary outcome: Percentage time spent sitting at work measured objectively using activPAL3 device worn on the thigh of participants (using Tegaderm dressing as a waterproof adhesive) continuously for seven days [197]. This was accompanied by completion of the daily log (see Appendix 14 for a copy of the logbook), where participants indicated the time they woke up, got to work, left work, went to bed and removed the device [197]. This logbook supported the analysis of the activPAL3 data.
2. Secondary outcomes:
 - a) Objective daily sitting time during waking hours (broken-down into working days and non-working days) measured using the activPAL3 device.
 - b) Subjective sitting time and physical activity time when at work (using the Occupational Sitting and Physical Activity Questionnaire (OSPAQ) [202]).
 - c) Subjective domain-specific daily sitting time (using items derived from the Workforce Sitting Questionnaire (WSQ) [69]).
 - d) General health and wellbeing assessed using relevant items from the Short Form 36 (SF36) Health Survey [203].
 - e) Work-related measures (sickness absence, productivity and presenteeism) using relevant items from the World Health Organisation (WHO) Health and Work Performance Questionnaire [204].

All subjective secondary outcome measures were obtained via an online questionnaire (hosted on Qualtrics) at T0, T1 and T2 (see Appendix 15 for copies of these questionnaires).

5.4.6. Data analysis

Process data analysis

Quantitative process data analysis included:

- Numbers that participated were defined as those who participated in each round of activPAL3 data collection. Numbers that dropped out were calculated as the differences between those who participated in each of the data collection rounds. Reasons for drop-out or non-participation were also provided where available.
- Awareness of the intervention and its various elements were reported as frequencies taken from the post-intervention online questionnaires.
- Safety and adverse events were reported in the online questionnaires and using the activPAL3 logbooks and were presented as frequencies where appropriate.

For the qualitative process data, the focus group and interview transcripts were uploaded onto NVivo v11 and a thematically analysed. Analysis was primarily done using pre-defined themes to cover key aspects of the process evaluation [191], which included issues relating to:

1. Intervention fidelity
2. Intervention satisfaction and suggested improvements
3. Contextual factors
4. Sustainability of intervention components
5. Outcome measure acceptability

Inductive thematic analysis was also carried out which allowed for the emergence of additional themes. The primary researcher read through all the transcripts to familiarise herself with the content prior to commencing the formal analysis. Data were coded according to the pre-determined themes. Direct quotations were used to describe the themes, enhancing credibility of the analysis. Focus group and interview data for each organisation were analysed together. Although the focus groups and interviews covered slightly different issues and from different perspectives, they contributed overall to a complete process evaluation. Once data had been analysed for each organisation, cross-cutting issues and differences between the organisations were explored as part of the inductive analysis.

Objective outcome data analysis

Objective outcome data for each participant at each time point (T0, T1 and T2) were downloaded from the activPAL3 devices using the activPAL software (PAL Technologies). Each participant's data were then exported into a separate Microsoft Excel workbook to allow further data processing. Within each workbook was a spreadsheet which contained a customised data analysis table, which allowed relevant "Events" data from the activPAL3 device to be interpreted more easily and to categorise the data as time spent sitting, standing and stepping. This customised table involved "sumifs" and "countifs" formulae (which filtered sums and counts from the "Events" data to check they met the correct conditions) and required the manual input of work start and finish times and wake and bedtimes (taken from the logbooks). Missing logbook data for work start and finish times were inputted as 9am and 5pm respectively. Missing logbook data for wake and bedtimes were estimated from the raw "Events" data (wake time estimated as first recorded sustained movement of the day and bedtime estimated as last recorded sustained movement of the day). Once these times were inputted, daily working and waking sitting time were established and averages calculated for each participant at each time point from the seven-day device wear-time. All days where the device was worn were taken as valid days. Where this included a partial day, the number of minutes wear time was divided by 1440 minutes (total minutes in 24 hours) to determine the proportion of the day the device was worn for. This allowed all collected data to be included and appropriate average daily sitting times to be determined. Furthermore, all participant data were included regardless of how many days the device was worn for, as average daily sitting

times were used. For days where “impossible” data were recorded (e.g., sitting/standing/stepping times of more than 1440 minutes), that day’s data were not included in the analysis.

Average daily working time and average daily workplace sitting time for each data collection period were used to calculate percentage daily sitting time during working hours, which was the primary outcome measure. Participants’ working times varied (i.e., due to flexible and part-time working), so providing an average time spent sitting at work in minutes or hours based on the raw data was not appropriate. However, to provide meaningful context, the percentages were then converted into minutes per 8 hour working day and presented alongside. Similarly, due to variations in “awake time”, secondary outcome measures (the total daily sitting time on a working day during waking hours and total daily sitting time on a non-working day during waking hours) were also converted into percentages. Breaking the data down into working days and non-working days allowed an assessment of whether or not there had been any compensation effect, e.g., if there had been a noticeable reduction in sitting time on a working day, had there been a subsequent increase in sitting time on a non-working day to compensate, which has been observed in some studies [67, 140].

All objective measures were exported into SPSS v25 and analysed at an organisational-level and presented as means and standard deviations. Absolute mean differences were determined by comparing T1 to T0 and T2 to T0 for each organisation for sitting time at work, daily sitting time during waking hours on a workday, and daily sitting time during waking hours on a non-workday.

For the primary outcome measure, individual-level data over the three time points were presented graphically for the small business and charity, but this was not possible for the local authority due to the larger number of participants. Relevant paired data for the primary outcome measure were then inputted into the G*Power v3.1 tool (<http://www.gpower.hhu.de/>) to compute effect sizes. Cohen’s d were used as effect size indices. Cohen defines $d = 0.2$, $d = 0.5$, and $d = 0.8$ as “small”, “medium”, and “large” effects, respectively [142]. Effect sizes of <0.2 are interpreted as a trivial difference between the two groups or over time, even if this difference has been determined to have statistical significance [142].

Subjective outcome data analysis

Subjective outcome data were taken from questionnaires which participants completed at T0, T1 and T2. The questionnaires used in this study were developed by combining selected items from other previously validated questionnaires (see below for details). Selected items were chosen in order to limit the length of the combined questionnaires used in this study.

Baseline demographic data were reported primarily as frequencies, but means were calculated for age and body mass index (BMI, which was calculated from participants reporting their height and weight). Job categories were taken from responses to one of the items from the WHO Health and Work Performance Questionnaire.

Baseline physical activity levels were determined using data obtained from the IPAQ short form questionnaire. These data were categorised into “Low”, “Moderate” or “High” levels of physical activity by determining the Metabolic Equivalent (MET)-minutes per week for each participant for walking, moderate and vigorous activity. This was done using the following equations:

- Walking: $3.3 \text{ (METS)} * \text{mins of activity per day} * \text{no. of days per week}$
- Moderate: $4.0 \text{ (METS)} * \text{mins of activity per day} * \text{no. of days per week}$
- Vigorous: $8.0 \text{ (METS)} * \text{mins of activity per day} * \text{no. of days per week}$

A total number of MET-minutes per week was then calculated for each participant by adding together all the above. The category of physical activity was then determined using the algorithm in Appendix 1 of Guidelines for Data Processing and Analysis of the IPAQ – Short and Long Forms November 2005 [205].

Means were calculated for each organisation at each time point from data relating to the self-reported percentage sitting time at work (from items taken from the OSPAQ [202]). These data were then exported into SPSS v25 to allow paired *t*-tests to be carried out to determine if there were any differences between objective and subjective sitting time at work. Two-tailed significance level was set at 0.05. Further data from the remaining items of the OSPAQ [202] and also the WSQ [69] were presented as means and standard deviations (calculated using SPSS v25) for each organisation at each time point.

General health and wellbeing data from selected items (15 out of 36) from the SF36 questionnaire [203] were analysed as per the scoring instructions provided by RAND [206]. This required pre-coded raw data to be converted to a recorded value as per Table 1 at the following weblink (https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html) to ensure that all items were scored so that a high score defines a more favourable health state. In addition, each item was scored on a 0 to 100 range so that the lowest and highest possible scores were 0 and 100, respectively. Scores represented the percentage of total possible score achieved. Then, items in the same scale as per Table 2 at the following weblink (https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html), were averaged together to create eight scale scores. The eight scale includes: physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy/fatigue, social functioning, pain, and general health. As only 15 out of 36 questions from SF36 were included in the combined questionnaires, not all items relating to each scale item were asked, therefore a full assessment for each scale was not possible.

Finally, self-reported data relating to work and health performance (obtained from selected questions taken from the WHO Health and Work Performance Questionnaire [204]) were analysed using SPSS v25. These data included perception of performance, presenteeism, work quality, concentration and health problems that limited work; and workdays missed due to health problems and holidays and days worked extra. Some of the questions required a response using a Likert scale, so for these the median response was used for analysis.

Other questions required responses in numbers of days or part days, so means and standard deviations were calculated for these questions using SPSS v25.

5.5. Results

A total of 57 participants initially volunteered and were eligible to take part in the “before and after” intervention measures part of this study (small business n=5, charity n=11, and local authority n=41).

For various reasons (e.g., participants forgot to put activPAL3 devices on, or had a mild skin reaction to the Tegaderm dressing), not all of the volunteers completed the objective data collection. Therefore, the number of participants who completed the objective data collection (n=52) differed to the number who completed the subjective data collection (n=57).

5.5.1. Participant characteristics

Table 5.1 provides a summary of the demographic, health and work-related characteristics of participants who completed the baseline activPAL3 data collection.

Table 5.1: Participant characteristics (those who wore activPAL3 devices)

| Characteristics of participants at baseline | Small business | Charity | Local authority | Total /Mean |
|---|----------------|---------|-----------------|-------------|
| Total number of participants | 5 | 10 | 37 | 52 |
| Mean age (years) | 36 | 38 | 41 | 38 |
| Female (n) | 1 | 7 | 26 | 34 |
| Ethnicity | | | | |
| - White British (n) | 5 | 9 | 32 | 46 |
| - Other (n) | 0 | 1 | 5 | 6 |
| Highest educational attainment* | | | | |
| - Degree or equivalent (n) | 0 | 7 | 15 | 22 |
| - Higher education (n) | 2 | 0 | 11 | 13 |
| - A level or equivalent (n) | 2 | 2 | 7 | 11 |
| - GCSEs grade A*-C or equivalent (n) | 0 | 1 | 3 | 4 |
| - No qualifications (n) | 0 | 0 | 0 | 0 |
| - Other – PhD (n) | 1 | 0 | 0 | 1 |
| Mean Body Mass Index (kg/m ²) | 27.0 | 24.9 | 27.9 | 26.6 |
| Smoker (n) | 1 | 1 | 3 | 5 |
| Units of alcohol per week | | | | |
| - 0 units (n) | 0 | 1 | 10 | 11 |
| - 1-4 units (n) | 2 | 4 | 11 | 17 |
| - 5-8 units (n) | 0 | 2 | 5 | 7 |
| - 9-12 units (n) | 1 | 1 | 2 | 4 |
| - 13-16 units (n) | 2 | 1 | 3 | 6 |
| - 17-20 units (n) | 0 | 1 | 3 | 4 |
| - More than 20 units (n) | 0 | 0 | 3 | 3 |
| Physical activity levels | | | | |
| - High (n) | 3 | 2 | 5 | 10 |
| - Moderate (n) | 2 | 4 | 22 | 28 |
| - Low (n) | 0 | 4 | 10 | 14 |
| Full-time (n) | 4 | 7 | 32 | 43 |
| Mean daily working time (mins) | 499 | 471 | 475 | 482 |
| Job Category | | | | |
| - Executive, administrator, or senior manager (e.g., CEO, Chief Executive, sales manager) | 2 | 2 | 2 | 6 |
| - Professional (e.g., engineer, accountant, systems analyst) (n) | 0 | 4 | 21 | 25 |
| - Technical support (e.g., lab technician, legal assistant, computer programmer) (n) | 2 | 0 | 4 | 6 |
| - Clerical and administrative support (e.g., secretary, PA, billing clerk, office supervisor) (n) | 1 | 4 | 9 | 14 |
| - Service occupation (e.g., security officer, food service worker, cleaner) (n) | 0 | 0 | 1 | 1 |

*One non-responder to this question in the local authority

Table 5.1 shows that the majority of participants were well-educated, White British females, aged late thirties to early forties. The small business demonstrated some differences compared to the other two participating organisations, as participants were predominantly younger males. Average BMI was in the overweight range for the small business and local authority participants, but within normal range for the charity participants.

Participants generally reported positive health behaviours, with few smokers or heavy drinkers, and the majority of participants had either high or moderate baseline physical activity levels. In terms of work-related characteristics, most participants worked full-time, which was reflected in similar mean daily working times across the three organisations. Participants ranged from senior managers to service occupations, with the local authority displaying the greatest variation in job category.

5.5.2. Process evaluation

Quantitative process evaluation

The numbers of participants that took part in each round of the activPAL3 data collection is shown in Table 5.2. For each organisation, there was a reduction in the number of participants over time. For the small business, the discrepancy between the number of participants and the number of valid activPAL3 data collected was primarily as a result of a problem with the devices and not with participation. In the charity, the reduction in number of participants was due to staff turnover and lack of time to complete the data collection. In the local authority, the main reasons for reductions in participation were participants opting out of the data collection, staff turnover, lack of time to complete data collection and annual leave commitments. In terms of adverse events, six participants experienced some issues with skin irritation as a result of the dressings used to adhere the activPAL3 devices to the thigh. These irritations were reported to be very mild and only resulted in one person dropping out of the study. No other health and safety issues were reported.

Table 5.2: Participation numbers during the intervention with reasons for drop-outs provided

| Organisation | T0 participants (n) | T1 participants (n) | T2 participants (n) |
|--|---|--|---|
| Small business (total number of staff n=8) | 5 (activPAL3 data available for n=5) | 5 (activPAL3 data only available for n=4 as 1 device did not work) | 4 (activPAL3 data only available for n=2 as 2 devices did not work; 1 person left organisation between T1 and T2) |
| Charity (total number of staff n=488) | 12 (activPAL3 data only available for n=10 as 2 people did not have time to complete data collection and dropped out of the study) | 10 (activPAL3 data only available for n=8 as 1 person left organisation and did not return device, 1 person did not have time to complete data collection) | 8 (activPAL3 data available for n=8) |
| Local authority (total number of staff n=4,146) | 45 (activPAL3 data only available for n=37 as 4 devices did not work, 1 person left the organisation, 1 person did not have time, 1 person's device went missing, 1 person dropped out due to irritation from the dressing) | 38 (activPAL3 data only available for n=28 as 3 people were on annual leave, 3 people opted out, 2 people had no time, 1 device did not work, 1 device was not returned; 7 people dropped out between T0 and T1) | 28 (activPAL3 data only available for n=21 as 5 people opted out, 1 person left the organisation, 1 device did not work; 10 people dropped out between T1 and T2) |

In the small business, it was likely that the three (out of eight) members of staff who chose not to participate in the study had some exposure to the intervention given the majority of their colleagues were participating. However, in the charity and local authority, the wider reach of the intervention (i.e., to staff who were not participating in the study) is unknown. For those who participated in the study, awareness of the intervention as a whole and the associated planned initiatives were assessed via the online questionnaire. Tables 5.3 to 5.5 highlight the awareness of the intervention amongst participants in the three organisations.

Table 5.3: Awareness of the “Sit Less at Work” intervention in the small business (total responses n=5)

| Awareness of: | Yes (n) |
|--|----------------|
| The “Sit Less at Work” intervention as a whole | 5 |
| Regular emails from Managing Director | 3 |
| Using computer prompts | 2 |
| Using exercise ball instead of chair | 2 |
| Competitions e.g., computer games, ping pong, press-ups | 4 |
| Rota for walking to the shops for lunch/snacks | 2 |
| Exercises with office dumbbells | 5 |
| Using wireless headsets | 2 |
| Social media promotion of “Sit Less at Work” | 4 |
| Inclusion of “Sit Less at Work” as an agenda item in team meetings and in the Wellbeing Policy | 2 |
| Other initiative not listed above | 2 |
| Unaware of any “Sit Less at Work” initiatives | 0 |

All participants in the small business were aware of the intervention as a whole and the exercises with the dumbbells. Of the remaining actions, some participants were aware of each of them. At this stage it was unclear if awareness was due to the actions occurring or because the participants were also part of the intervention development group.

Table 5.4: Awareness of the “Sit Less at Work” intervention in the charity (total responses n=9)

| Awareness of: | Yes (n) |
|---|----------------|
| The “Sit Less at Work” intervention as a whole | 9 |
| Regular communications re. “Sit Less at Work” intervention | 8 |
| Encouragement to set personal targets for steps per day | 3 |
| Sit less success stories being celebrated on the intranet | 1 |
| Encouragement to join or set-up lunchtime walking/running group | 3 |
| The clear office / desk policy | 5 |
| Team meetings incorporated periods of standing/moving | 4 |
| Policy changes to support sitting less at work | 1 |
| Other initiative not listed above | 0 |
| Unaware of any “Sit Less at Work” initiatives | 0 |

All participants in the charity were aware of the intervention as a whole and eight out of nine participants were aware of the regular communications relating to the intervention. However, the other actions were much less well known by participants.

Table 5.5: Awareness of the “Sit Less at Work” intervention in the local authority (total responses n=28)

| Awareness of: | Yes (n) |
|---|---------|
| The “Sit Less at Work” intervention as a whole | 25 |
| Regular communications with suggestions to sit less at work | 12 |
| Encouragement to lead or participate in step competitions | 2 |
| Team standing breaks | 2 |
| Posters near photocopiers to encourage stretches | 13 |
| Posters and stands in meeting rooms to encourage sitting less and moving more | 10 |
| The inclusion of some standing or moving in team meetings | 2 |
| The inclusion of sitting less and moving more in 1:1s | 1 |
| The inclusion of sitting less and moving more in workplace guidelines | 5 |
| Other initiative not listed above | 6 |
| Unaware of any “Sit Less at Work” initiatives | 2 |

The majority of participants from the local authority were aware of the intervention as a whole. Many participants were aware of regular communications, posters near the photocopiers and posters and stands in the meeting rooms. All the other actions were much less well known and two participants reported being unaware of any of the “Sit Less at Work” initiatives.

Given the overall lack of awareness of the various intervention actions across all three participating organisations, it was unlikely that these actions reached staff who were not participating in the study, hence the wider reach of the interventions appeared to be poor.

Qualitative process evaluation

The five pre-determined themes (intervention fidelity, intervention satisfaction and suggested improvements, contextual factors, sustainability of intervention components, and outcome measure acceptability) are reviewed in turn:

1. Intervention fidelity

There were issues with intervention fidelity in all three participating organisations, i.e., none of the interventions were implemented as originally intended.

Small business

According to participants in the small business, the only actions of the original intervention that were implemented fully were exercises with the office dumbbells and walking to the shops for lunch,

“...the walking to the shops worked well, I think that was people just kind of realising how nice it was, just to walk down to the shops and back, you know... is was a revelation and erm the dumbbells have worked very well... and that’s because we’ve got... a bit of competition in the office and there is also somebody who likes weights and is happy to train people so that because of the expertise was there” (MD, interview, small business).

The reasons that these initiatives were thought to have worked were because, “...they sort of met with our interests” (Participant A, focus group, small business) and were easily accessible, particularly using the office dumbbells, which could be done at their desks (either standing or sitting). The regular use of the office dumbbells links in with the widespread awareness of this action as highlighted in Table 5.3.

One action that did not happen at all during the intervention period was the development and use of computer prompts to remind staff to sit less at work. This was due to underestimating the time it would have taken to develop such a prompt,

“...technically we couldn’t do that, I mean, I think it can be done with more time spent on it... I think with more, a bit more priority and development on it, it could have been done, but it wasn’t as quick, thing as I thought it would be” (Participant A, focus group, small business).

Actions which were partially implemented were:

- The promotion of the intervention on the organisation’s social media platforms
- Ping pong and press-up competitions,
“You know, we started with it but then it just sort of fizzled out without that push to keep doing it” (Participant B, small business).
- Use of the exercise ball instead of a chair, where only one member of staff regularly used the ball during team meetings
- Use of wireless headsets to enable standing/movement when on the phone,
“The headsets that we got supplied with we didn’t particularly like... cos they are really loud” (Participant A, small business)
- The weekly emails from the MD to encourage and support staff to sit less at work, which occurred only at weeks 1, 2 and 5. This was despite email templates being provided and the MD being fully on board and supportive of the intervention.

There were also some actions that developed during the intervention period, which were not originally planned, including boxing at work and taking part in physical activity outside of the workplace,

“It all just sort of snowballed, and before you know it you know you are going to the gym together or you’re you know you go for walks at the weekend” (Participant A, focus group, small business).

Charity

In the charity, two actions from the original intervention were fully implemented. First, the clear office/desk policy was implemented. However, this action was planned prior to the “Sit Less at Work” intervention not to help staff sit less, but to ensure desks and offices were kept clutter-free, and in fact it was felt that,

“...the clear desk thing is, the link is tenuous and maybe even one of those things where you might not want it tied to it cos it’s not necessarily helpful.” (Participant C, focus group, charity).

Second, an initial communication was sent to managers informing them about the intervention and how they could support and encourage staff to sit less. Prior to starting the intervention, it was decided that emails from the Chief Executive would not be the most appropriate communication method,

“I think that a weekly email from [Chief Executive] was never going to be achievable for us. If I just think about his role, it’s very externally facing, culturally it wouldn’t have kind of worked” (Key Personnel, interview, charity).

Communications about the intervention were instead included in the monthly “Core Brief” and on the local intranet social media platform, Yammer.

Actions that did not get implemented included: setting personal targets for steps per day and tracking this using personal FitBit devices or pedometers from the organisation; celebrating sit less stories; setting-up a lunchtime walking group or participating in the existing running group; holding team meetings stood-up or incorporating some standing/moving into team meetings (a suggestion in the managers brief); and changes to workplace policies or guidelines. Changes to guidelines were felt to be problematic as the existing health and wellbeing guidance was focused on attendance and adding more content into the guidance,

“...would probably just get lost in all the deluge of information that’s there anyway” (Implementer, interview, charity).

Finally, the general feeling about the intervention as a whole was that it was not promoted effectively enough and hence it was only those who were participating in the data collection that were tuned into “Sit Less at Work” communications,

“But for the wider organisation I would think it probably hasn’t impinged too much on people’s lives I would say” (Participant A, focus group, charity).

Local authority

In the local authority, none of the initiatives from the original intervention were fully implemented. An initial communication was placed in the Chief Executive’s weekly column and a message about the intervention was put on the local intranet, but this was a “one-off” and not maintained during the 12-week intervention period. This was despite template communications being provided by the primary researcher.

Holding standing meetings did occur within some teams, but this was not consistent across the entire organisation. This action was suggested in an email that was sent out to all managers (not part of the original intervention), which included a range of “top tips” to sit less at work for them to support their staff with. Some managers put this into action, but as one participant stated,

“It depends on your team and your manager and stuff, and when you have team meetings and stuff” (Participant F, focus group 2, local authority).

Team step competitions and having team standing breaks did not seem to take place. The way these actions were attempted to be operationalised was as suggestions in the email sent to managers rather than being led at a corporate-level,

“And I think then there was the sort of, the competition-type steps things which I don’t really think happened... I know we’ve sort of tried to encourage managers to do it themselves, but I’m not sure because it wasn’t corporate-led whether that, well, I don’t think it will have happened.” (Implementer, interview, local authority).

It was unclear why including a prompt on sitting less and moving more in the one-to-one appraisal meeting template did not happen. There was an existing section around health and wellbeing, so adding in a prompt about sitting less and moving more should have been possible. Further, the implementer stated,

“I can put it in the guidance, I could put it in tomorrow” (Implementer, interview, local authority).

There were actions developed that were not part of the original intervention, such as putting posters and small Perspex boards in meeting rooms reminding staff to stand or move, and putting up posters by the printers and photocopiers with ideas for stretches staff could do whilst waiting (see Appendix 19 for images of the posters). Some of the participants were aware of these additional actions (as highlighted in Table 5.5), but not all, particularly those in customer services roles who use the meeting rooms and printers/photocopiers less often than other staff. For those who did see the posters, the feedback was generally positive, although some participants reported not feeling comfortable to do the stretches in front of other people.

2. Intervention satisfaction and suggested improvements

Intervention satisfaction

The interventions were in principle deemed to be acceptable in all three organisations. However, satisfaction with all proposed actions cannot be assessed given many of them did not happen. Due to the low-profile nature of the interventions in the charity and local authority, participants were a little disappointed as they were expecting to see or hear more,

“I was waiting for some information to come through to say what were supposed to be doing” (Participant B, focus group 2, local authority).

As reported in the online questionnaires, most of the participants (from all three organisations) highlighted that participating in the project had helped to raise their awareness of the issues relating to prolonged sitting at work. This increased awareness had prompted some small behaviour changes in individuals, such as going to the toilet on a different floor or taking a lunchtime walk. In terms of satisfaction with the “Sit Less at Work” actions, five of the charity participants reported particularly liking the Yammer communications as it maintained motivation, but two participants reported this action being the one they liked the least as it was too repetitive. In the local authority, participants liked the posters in the meeting rooms and by the printers

and photocopiers the most, as they acted as reminders for them to sit less and move more.

Suggestions for improvement raised by all three participating organisations

Key personnel from all three organisations reported the wish to learn from best practice or from what other organisations were doing/have done so that they do not have to “reinvent the wheel” (Key Personnel A, joint interview, local authority) and to allow some understanding of,

“How did it work for you, what did you do and share that because that would also be helpful to you know they could gain ideas from us and us from them” (MD, interview, small business).

In addition, the key personnel from the local authority were keen to learn from the findings of this study,

“...so, things that we thought maybe, we couldn’t do or maybe difficult or that haven’t happened as we thought, what can we build in to be more regular, what’s a definite ‘no’, what can we focus on, are there other ideas and things that we can incorporate erm so that we can plan it, more longer term I think, so I would like to think that we are then using the evidence and everything that has been collected to do something with it.” (Key Personnel A, joint interview, local authority).

Including some form of technology into the intervention was highlighted as a potential improvement by many participants in all three organisations. Suggested technologies included pedometers or devices such as FitBits, which could act as prompts to encourage staff to sit less and move more,

“If we could offer out free Fitbits to everybody and there was a competition who did the most steps then people might start buying into it a bit more mightn’t they” (Participant B, focus group 1, local authority).

Participants from all three organisations also reported that there needed to be a champion or advocate within the organisation to lead by example and drive the initiative forwards and keep the momentum going,

“And maybe that’s probably where again we fell down in the fact that we didn’t sort of see who would be an advocate for it in that respect, because there will be people who are in senior leadership who were really into health and wellbeing and everything that would have probably taken it and driven with it” (Implementer, interview, local authority).

Suggestions for improvement in the small business

In the small business, the importance of investing more time and energy into the implementation of the intervention at the start to make the intervention become more sustainable was suggested,

“...maybe that initial phase we needed to push a little bit more just to get those things in place and then they might have lasted a bit more and, you know, less would have dropped off, so more and more effect would have happened. I’m not sure, it’s that initial phase of, we are all on board, we are all going to do this, it’s going great and then mmm it’s gone, as opposed to a little bit more energy at that beginning phase to get a few more things established, and it’s almost like that cultural change it’s pushing for that cultural change so that energy at the beginning to then, so it’s self-sustaining afterwards” (MD, interview, small business).

The MD from the small business felt that small businesses might benefit from a more strategic approach to sitting less at work, which comes from a higher level (such as the central government) with additional support available in the form of applications or computer screen pop-ups,

“I think you could... have a centralised government sit less [initiative] that pops up you know and if you subscribe to it as a thing, it will you know, the app comes up, you know you are given the app... it’s a cultural change as much as a sort of, and that would be... much more cost effective and work on a sort of scaled operation rather than... but it wouldn’t have to be internally driven, it could be external and it could be you know the [city name] Sit Less Project or the [region]... and that would then feed out, that’s how I see it.” (MD, interview, small business).

Developing short-lived actions was suggested by participants in the small business as a way of keeping staff more focused. For example, keeping the duration of the competition-based initiatives (press-ups and ping pong) to just one week per month,

“And it’s just for the one week because then it’s done rather than sort of dragging it out” (Participant B, focus group, small business).

Suggestions for improvements in the larger organisations (charity and local authority)

Participants from the charity and local authority reported the importance of having the “right people” involved at the start of the process in order to support the development and implementation of the intervention,

“I guess it’s quite difficult as well because we’ve got, see you could have all the will in the world that you want do some of this stuff, but unless you’ve got the right people around the table, it might not happen. Because you might not understand the way that some things work.” (Implementer, interview, charity)

It was felt by some participants in the charity and the local authority that the interventions actually needed to be more bespoke, possibly down to a team-level, as certain teams/directorates, e.g., customer services, face different challenges than other teams. The local authority key personnel also felt that the idea of co-creating such interventions at a team-level would lead to more sustainable action plans,

“...what would really make the difference is, if a team then you know say if like the head of service embraces it and then works with their team to say right, us as a team, what do we think we should be, we could do on this agenda [sitting less at work] and then for them to have you know for the people to have that ownership and buy-in and to you know like co-create the plan for the team. As opposed to us or their manager creating the plan and then saying right, we are going do it and impose it on people, so it is that concept of it empowering and co-creating with people. I think that would make it more sustainable in the longer term” (Key Personnel B, joint interview, local authority)

3. Contextual factors

Contextual barriers related to the nature of office-based working

Workload pressures experienced by participants from all three organisations were reported to affect their

participation in the intervention,

“I have just literally sat in a, sat in a zone crunching things and hardly moved at all. Erm because I’ve got so much that I need to shift” (Key Personnel B, joint interview, local authority).

Furthermore, in the charity and local authority, workload pressures for the implementers limited their ability to give the time needed to ensuring the interventions were implemented as intended,

“The only barrier was workload, that was probably the main thing. Because we are encouraged to do a lot of stuff. We know we’ve got the freedom to do a lot of this, and I think it was just time that we could have spent on implementing correctly.” (Implementer, interview, charity).

This suggests that the implementers needed further support in their role or there needed to be a team of implementers involved in order for the “Sit Less at Work” intervention to be successfully rolled-out. This links in with the previous theme where it was suggested for the implementation to have been successful there needed to be the “right people round the table”.

Difficulty overcoming the social norm of sitting was highlighted as an issue in all three organisations. The MD from the small business felt this was a cultural issue, which has been ingrained in us since childhood with the requirement to be sat at your desk in school in order to learn,

“...you’re educated from very early that that’s the way you kind of work, learn, operate erm but it doesn’t have to be that way” (MD, interview, small business).

Even when nudged into standing instead of sitting, the social norm overrides this, as was reported in the local authority when a couple of meeting rooms, which had sit-stand desks in them were set-up for standing meetings, but

“...very quickly, they get lowered and chairs get moved in” (Key Personnel A, joint interview, local authority).

In addition, there was the perception that, for example, standing meetings are,

“...a bit weird if you’re used to, you all sit round a table” (Participant A, focus group, charity).

Despite these reported barriers, participants from each organisation provided examples of individuals performing sitting less behaviours, e.g., managers doing walking one-to-ones, standing meetings within specific teams, incorporating movement into meetings, lunchtime walks, walking up to the next floor to go to the toilet, taking regular breaks. However, these were not happening in a systematic or structured way and had no formal support, it was simply individuals taking it upon themselves to make some changes.

Contextual barriers specific to the small business

The small business experienced quite a few staff changes during the intervention period and soon after. Given

they only had eight members of staff in total, any changes inevitably had a larger impact when compared to organisations with a greater number of employees. The MD of the small business identified that the new member of staff that joined the organisation was not inducted into the “Sit Less at Work” intervention,

“I’m not sure that he is aware of this project I don’t know if we have introduced him to the Sit Less Project that’s quite interesting, erm yes, I don’t think we’ve even introduced him to it, that’s terrible, ok... so no I don’t think it did permeate but that again may be due to us not pushing the message more than, more than you know they have seen us doing the stuff and the weights and the things but were not necessarily tied it together to a this is, why we are doing it” (MD, interview, small business).

Contextual barriers associated with the larger organisations (the charity and local authority)

Competing priorities within the larger organisations was a barrier to the roll-out of the “Sit Less at Work” interventions. For example, other health and wellbeing initiatives, such as those linked to mental health, were perceived to be higher on the agenda than sitting less at work,

“...if you look across the nation it’s kind of the noise around mental health is much greater than other stuff I think” (Key Personnel, interview, charity).

In addition, the charity was planning for an upcoming relocation to a new building, so the focus of much of the organisation was on this change. It was felt by the key personnel that this had a big impact on the roll-out of the “Sit Less at Work” intervention,

“I think in some respects the projects’ been impacted detrimentally... because people’s priorities around making changes are linked to the move rather than the here and now... the volume of change is really unique for us so I think it’s got lost if I’m being brutally honest.” (Key Personnel, interview, charity).

Nevertheless, it was anticipated that the relocation to the new building would result in changes to the way staff work, with an emphasis being placed on “agile working” (where staff were not allocated a specific desk, but instead provided with the technology required to work flexibly from a number of different locations within the new building). These changes to the way staff will work were instigated, not only to promote the health and wellbeing of staff, but also to support collaborative working and increased productivity.

For both the charity and local authority, there had been a recent drive to move away from corporate communications, such as organisation-wide emails, to try to limit the volume of emails being received by staff. Therefore, the charity and local authority chose different methods to communicate the messages relating to the “Sit Less at Work” intervention, such as the local intranet, internal social media platforms, disseminating information to managers, and using core briefs or the Chief Executive’s column. For the charity, sending the communications was the responsibility of the implementer and these were primarily shared via the internal social media platform, Yammer, but it was reported that this platform is not used by all staff,

“It was done mostly via Yammer if I’m right and Yammer is for people that Yammer, Yammer then it’s

like [popular social media platform] people that Yammer, Yammer, people who don't, don't so it will have had limited reach." (Participant A, focus group, charity).

The local authority experienced further difficulties in terms of the communications as there was a lack of buy-in from the communications team from the start,

"I don't think we got that [buy-in] at the start because I don't think we got them attending the first session, um, and I don't think, even though they've got all the information and all the stuff, I don't think the buy-in was there from them or the commitment." (Implementer, interview, local authority).

No member of the communications team attended the implementation meeting that was held in the local authority to plan the roll-out of the intervention. Despite being provided with all the template communication messages with times to be sent out, only an initial communication was shared. This was further complicated by a restructure within the communications team at the time, which meant that promoting this intervention was not a priority for them.

Getting more buy-in from management to support the "grass-roots" intervention development process was suggested by participants from the charity and local authority, so that implementation was not the responsibility of just one individual (the implementer),

"I think there needs to be consent and recognition from the management team to make the grass roots work" (Participant A, focus group, charity).

The existing organisational culture acted as a barrier to implementing the interventions. For example, there was reported to be a "culture of meetings" (Key Personnel A, joint interview, local authority) in both the charity and local authority, which meant sometimes staff could be in back-to-back meetings all day. This left little time for staff to purposefully sit less due to the difficulties associated with breaking the social norm of sitting in meetings as previously discussed. One participant stated that the culture in the charity did not promote protected time (such as over lunchtime), so meetings could be scheduled during this time. Therefore, "...without the whole organisation actively making a change" (Participant C, focus group, charity), it made it difficult to change behaviour at an individual-level. Furthermore, there were different barriers reported depending on teams or job role, which impacted the ability of participants to instigate any "Sit Less at Work" actions. For example, customer services staff could only take minimal breaks and had to account for their time, so they were,

"...very restricted compared to the whole of the council to be fair" (Participant D, focus group 2, local authority).

This linked into the suggestion above about the benefits of having more bespoke action plans for certain teams/directorates in the larger organisations.

Local authority-specific contextual barriers

An issue related to organisational culture specific to the local authority, was the idea that the responsibility for sitting less at work should lie more with the team managers and the individual, and come less from a corporate-level,

“The argument for me would be well actually, all managers out there, you know are responsible for the health and wellbeing of their teams and then people have an individual responsibility and so some of this, is a shift towards how much can we help shape and influence and maybe provide a bit of a framework but actually some, a lot of the doing, it’s empowering other people, to do that and what works best in their teams you know so it’s not all, they are not all being told what to do you know by big brother or the corporate centre” (Key Personnel B, joint interview, local authority).

This could explain why including sitting less and moving more within the one-to-one appraisal was not carried out, even though it was feasible and straightforward to achieve. Furthermore, in the local authority, health and wellbeing initiatives were usually promoted as a social marketing campaign, pushed for short periods of time to raise awareness and signpost to resources, rather than investing in longer-term behaviour change strategies,

“And I think one of the things for me was like we were doing it over this 12-week period, that doesn’t necessarily work in terms of how we’re set up to do things. So, if you take for example like mental health, we’ll do things periodically and have a push, periodically through the year, and we will plan that into a calendar cos we don’t have the resources to devote and spend sort of like a chunk of time, but we do have the resources to sort of like spread out at certain periods. So, doing a campaign and a thing where we you know may be do something once a quarter would fit better with us and our resources erm.” (Key Personnel B, joint interview, local authority).

Organisational-specific contextual enablers

In the small business, both the staff and the MD were fully on board and supportive of the intervention,

“I believe in it [the intervention] whole heartedly because I’m somebody who is active, therefore I took on board the project, I took it on board because of that. My belief is that you know we generally are a society that sits down too much, it’s too sedentary so and our work is actually of that nature, so because of that I felt that we should take part.” (MD, interview, small business).

This setting should, therefore, have provided a good basis for the successful roll-out of the “Sit Less at Work” intervention. However, despite this, the outcome evaluation showed no change in workplace sitting time and the process evaluation found that the intervention was not implemented as intended.

Participants from the small business did perceive some form of culture shift however, associated with the increased awareness of the issues related to prolonged sitting at work,

“It’s almost like joking with each that we should all be sitting less so it’s almost like ‘Sit Less’ has become like the common phrase for us to use” (Participant B, focus group, small business).

Participants from the charity felt that the organisation employs a large number of active people, so many staff would have been amenable to participating in the intervention and could have been champions for the “Sit Less at Work” intervention,

“I think we’ve got quite a lot of people in the business actually in their own ways are champions for this sort of thing so we have a lot of we have a lot of very, very active people” (Participant C, focus group, charity).

In the local authority, it was felt that due to the open plan nature of the main building, there was a potential for good sitting less at work behaviours to “rub off” on other teams,

“The bonus is, with having an open office, and you’re all next to departments, you would hope, if you were in a department, where one’s quite liberal, whatever, all get up and walk round... But the next teams not, but they see you do it, it does kind of rub off sometimes doesn’t it” (Participant C, focus group 1, local authority).

4. Sustainability of intervention components

In the small business, the use of the dumbbells and staff going to the gym together continued after the intervention period ended. In the charity, no initiatives persisted and in the local authority only the prompts near the printers/photocopiers and in the meeting rooms remained.

To support sustainability of the intervention at an organisational-level, it was suggested that certain outcomes or broader impacts be assessed, including the impacts on the health and wellbeing of staff and any associated improvements in productivity,

“...if you could quantify the productivity benefits to a managing director, so the bottom line, cos most managing directors all they are looking at is the bottom line... which is a shame because I’m looking at... the overall benefit to people’s wellbeing erm so it’s a mix of those two messages, it’s you know your staff will be better and healthier and happier and probably more productive too, therefore it’s a good idea” (MD, interview, small business).

Furthermore, whether the intervention resulted in long-term behaviour change was also felt to be an important sustainability metric from an organisational perspective,

“...it is about not only the benefits in terms of you know during a period of campaign but it’s about is that period of campaign resulting in longer lasting, longer lasting sort of behavioural change” (Key Personnel B, joint interview, local authority)

5. Outcome measure acceptability

Participants from all three organisations agreed that the outcome measures used (activPAL3 devices, logbooks, and online questionnaires) were acceptable. Only minor issues were reported including:

- Workload pressures when completing the questionnaires,

“No there was only one survey that I ended up missing and again that was a workload thing” (Participant A, focus group, small business).

- Concerns about accuracy when completing the questionnaires,

“There was lot of it and I’m thinking I’m literally going on my mood that day so I’m not sure how accurate I would have completed that questionnaire” (Participant B, focus group, charity).
- Forgetting to complete the logbook,

“The only thing I sometimes forgot to log was the little booklet” (Participant B, focus group, small business).
- Problems with the dressings used to adhere the activPAL3 devices onto participants’ thighs,

“I struggled with my dressing, I think it’s because I use body lotion” (Participant C, focus group, small business).

5.5.3. Primary outcome data

Table 5.6 summarises the primary outcome data at T0, T1 and T2 for the three participating organisations.

Table 5.6: Objective sitting time at T0, T1 and T2 from activPAL3 data

| | Small business (n=6) | Charity (n=12) | Local authority (n=45) |
|---|---------------------------------|---------------------------|---------------------------------------|
| % sitting time at work at T0, mean (SD) [time in minutes/8hr working day] | 81.62 (10.60) [392] | 75.29 (9.27) [361] | 71.62 (13.83) [344] |
| % sitting time at work at T1, mean (SD) [time in minutes/8hr working day] | 77.30 (6.55) [371] | 76.74 (6.22) [368] | 73.27 (13.68) [352] |
| % sitting time at work at T2, mean (SD) [time in minutes/8hr working day] | 82.94 (7.18) [398] | 71.58 (14.69) [344] | 67.77 (15.54) [325] |
| Mean difference between T0 and T1, % sitting time* [time in minutes/8hr working day] | -4.32 [-21] | 1.45 [7] | 1.65 [8] |
| Mean difference between T0 and T2, % sitting time* [time in minutes/8hr working day] | 1.32 [6] | -3.71 [-18] | -3.85 [18] |

Values reported are means (standard deviations) from all available data.

**Mean differences were determined by subtracting data for T1 or T2 from data for T0.*

Table 5.6 demonstrates that at baseline, participants from the small business sat for the greatest proportion of the working day and the local authority the least. For the small business, there was a small decrease in sitting time when comparing T0 to T1, but by T2 the proportion of sitting time had increased to greater than it was at baseline (although this increase was only based on data from two participants). For the charity and local authority, the proportion of time spent sitting increased when comparing T0 to T1, but then at T2 had decreased compared to the baseline finding.

Table 5.7: Effect sizes by organisation for changes in objective sitting time from T0 to T1 and T0 to T2

| | Organisation | Mean difference (SD), % sitting time at work* | Effect Size (dz) |
|-----------------------|---|--|------------------|
| Comparing T0 to T1 | Small business (n=4) [time in minutes/8hr working day] | -1.80 (4.68) [-9] | -0.38 |
| | Charity (n=8) [time in minutes/8hr working day] | 3.41 (5.79) [16] | 0.59 |
| | Local authority (n=28) [time in minutes/8hr working day] | 1.82 (19.12) [9] | 0.10 |
| Comparing T0 to T2 | Small business (n=2) [time in minutes/8hr working day] | -0.95 (3.87) [-5] | -0.25 |
| | Charity (n=8) [time in minutes/8hr working day] | -3.84 (9.92) [-18] | -0.39 |
| | Local authority (n=20) [time in minutes/8hr working day] | -1.32 (18.52) [-6] | -0.07 |

*Mean differences were determined using paired data, data which were not paired were excluded from this analysis which is why the “n” is different compared to Table 5.6

Table 5.7 highlights small effect sizes, in the direction of reductions in sitting time at work, for the small business when both T1 and T2 were compared to T0. For the charity, a medium effect size was seen when comparing T0 to the T1, but in the direction of an increase in sitting time at work, then a small effect size in the direction of a reduction in sitting time at work was seen when comparing T0 to T2. For the local authority, there was only a trivial difference when comparing both T0 to T1 and T0 to T2; initially this was in the direction of an increase in sitting time at work and then in the direction of a reduction in sitting time at work.

Figures 5.1 and 5.2 show the individual-level data for both the small business and charity participants. It was not possible to demonstrate individual-level data graphically for the local authority participants due to the larger numbers.

Figure 5.1: Individual-level data for small business participants at T0, T1 and T2

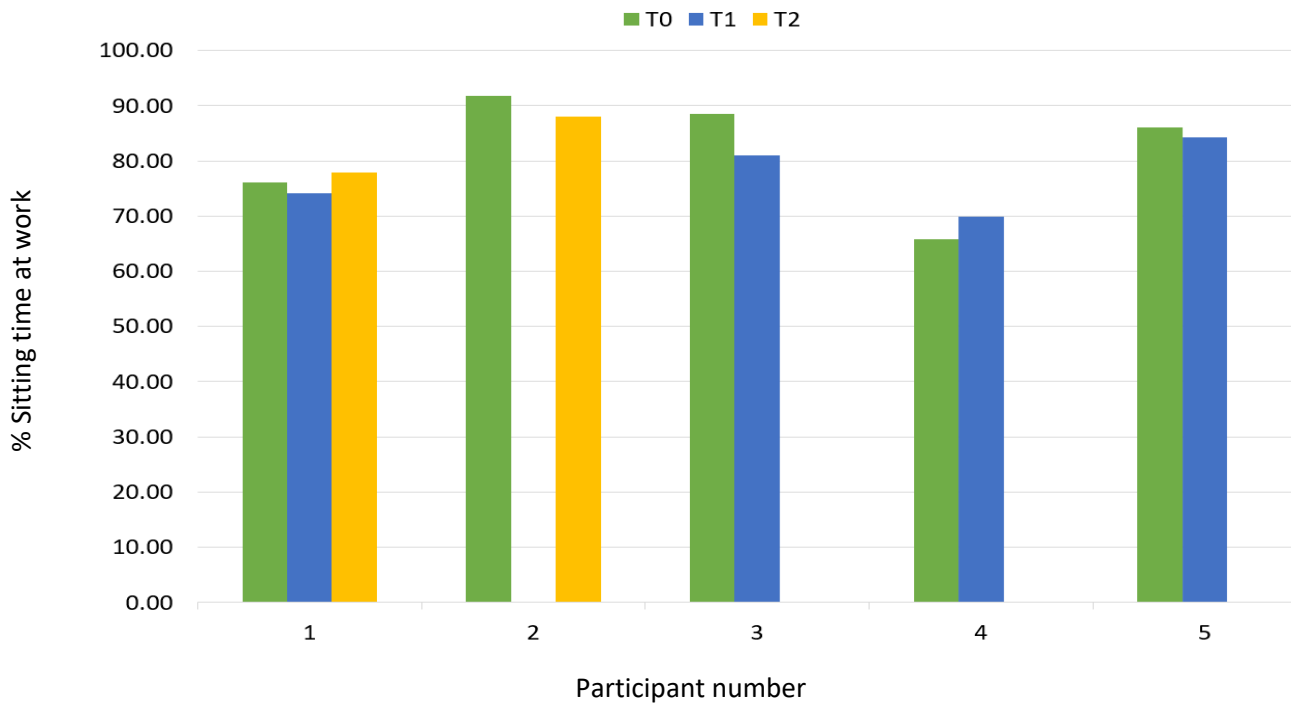
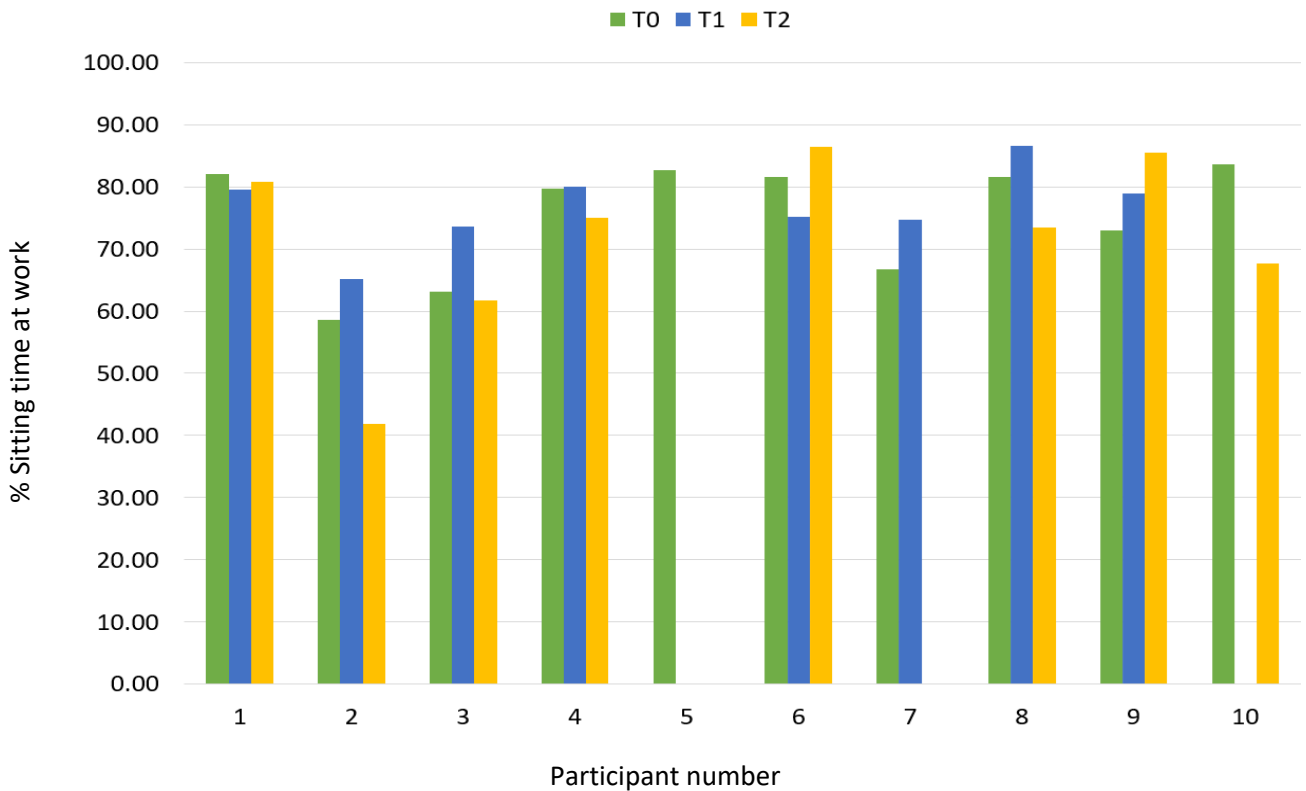


Figure 5.2: Individual-level data for charity participants at T0, T1 and T2



Figures 5.1 and 5.2 highlight that not all participants in the small business and the charity completed all three rounds of data collection. At an individual-level, there was a great deal of variation in terms of changes to percentage sitting time at work. Some participants reduced their sitting time at work over time; some

participants increased their sitting time at work over time; some participants demonstrated increases in sitting at work at T1 and then decreased again at T2; some participants showed a reduction in sitting time at work at T1 and then a subsequent increase at T2.

Individual-level data for each participant (including the local authority participants) can be found in Appendix 18. The variation in individual-level data shown by participants in the small business and charity was also reflected in the local authority participants' data.

5.5.4. Secondary outcome data

Objective secondary outcome data

Percentage daily sitting time on a working day and on a non-working day for participants from each of the three organisations were determined from objective data collected from the activPAL3 devices.

Table 5.8: % daily sitting time on a working and non-working day for each organisation at T0, T1 and T2

| | | Small business (n=5) | Charity (n=10) | Local authority (n=38) |
|--|------------------------|---------------------------------|---------------------------|-----------------------------------|
| % daily sitting time on a working day | Mean (SD) at T0 | 75.56 (5.57) | 68.42 (4.85) | 67.87 (9.44) |
| | Mean (SD) at T1 | 72.39 (3.74) | 69.75 (6.40) | 67.36 (9.74) |
| | Mean (SD) at T2 | 75.51 (11.67) | 68.35 (7.14) | 64.95 (9.85) |
| % daily sitting time on a non-working day | Mean (SD) at T0 | 59.27 (11.97) | 59.91 (10.81) | 62.26 (12.23) |
| | Mean (SD) at T1 | 58.82 (4.39) | 63.66 (13.01) | 62.31 (8.82) |
| | Mean (SD) at T2 | 61.36 (21.44) | 61.67 (7.05) | 59.49 (13.95) |

Table 5.8 highlights that participants from each organisation sat less on a non-working day compared to a working day at all three time points. This difference was most marked for participants from the small business. However, in terms of changes over time for both daily sitting on a working and non-working day there was little variation.

A comparison of objective and subjective sitting time at work was then conducted. The data in the Table 5.9 show mean objective and subjective percentage sitting time for each organisation at each time point and the results from the paired *t*-test. The data were taken from participants who completed both data collection methods only (i.e., where paired data were available).

Table 5.9: Subjective vs objective % sitting time at work for participants from the three organisations at the three time points

| | Organisation | Mean objective % sitting time at work [time in minutes/8hr working day] | Mean subjective % sitting time at work [time in minutes/8hr working day] | Mean difference (SD) [time in minutes/8hr working day] |
|-------|------------------------|--|---|---|
| At T0 | Small business (n=5) | 81.62 [392] | 88.00 [422] | 6.38 (12.85) [31] |
| | Charity (n=10) | 75.28 [361] | 86.00 [413] | 10.72 (8.14) [51] |
| | Local authority (n=36) | 71.54 [343] | 82.89 [398] | 11.34 (17.72) [54] |
| At T1 | Small business (n=4) | 77.30 [371] | 64.00 [307] | -13.30 (45.89) [-64] |
| | Charity (n=8) | 76.74 [368] | 87.50 [420] | 10.77 (5.65) [52] |
| | Local authority (n=29) | 73.27 [352] | 78.28 [376] | 5.01 (21.86) [24] |
| At T2 | Small business (n=2) | 82.94 [398] | 75.00 [360] | -7.94 (14.25) [-38] |
| | Charity (n=8) | 71.58 [344] | 83.13 [399] | 11.54 (17.89) [55] |
| | Local authority (n=21) | 67.77 [325] | 79.10 [380] | 11.33 (27.24) [54] |

Table 5.9 shows that, in general, participants over-estimated the proportion of time they spent sitting at work by between 5% (24 minutes) and 12% (55 minutes). The exception to this was the small business participants at T1 and T2 who under-estimated the proportion of time they spent sitting at work by around 13% (64 minutes) and 8% (38 minutes) respectively.

Subjective secondary outcome data

For the further data analyses reported below, all participants who completed the questionnaire data were included. In terms of sample size, this included a total of: T0 n=57, T1 n=43, T2 n=34. For each organisation, the sample sizes were: small business T0 n=5; T1 n=5, T2 n=4; charity T0 n=11; T1 n=9, T2 n=8; local authority T0 n=41; T1 n=29, T2 n=22.

First, data relating to self-reported percentage time spent in different work activities (sitting, standing, walking and heavy labour) was reviewed. Table 5.10 highlights that participants from all organisations reported spending the vast majority of their time sitting at work with very little of the time spent doing any form of heavy labour. The amount of time spent standing or walking was broadly similar for each organisation at each time point.

Table 5.10: Self-reported % time spent on different work activities for each organisation at each time point

| Activity | T0 | T1 | T2 |
|---|-------------|------------|-------------|
| % time sitting at work, mean (SD) | | | |
| - Small business | 88.0 (5.7) | 86.5 (4.4) | 75.0 (12.9) |
| - Charity | 85.5 (3.5) | 87.2 (3.6) | 83.1 (6.5) |
| - Local authority | 82.8 (18.7) | 83.4 (9.5) | 80.5 (12.4) |
| % time standing at work, mean (SD) | | | |
| - Small business | 6.6 (4.8) | 4.3 (1.0) | 17.5 (13.2) |
| - Charity | 5.9 (2.0) | 5.0 (0.0) | 6.9 (2.6) |
| - Local authority | 7.5 (10.0) | 6.5 (3.1) | 8.3 (5.0) |
| % time walking at work, mean (SD) | | | |
| - Small business | 4.8 (3.1) | 7.5 (3.3) | 6.3 (2.5) |
| - Charity | 8.6 (3.2) | 7.8 (3.6) | 8.8 (3.5) |
| - Local authority | 9.4 (11.9) | 10.0 (7.2) | 9.4 (6.6) |
| % time heavy labour at work, mean (SD) | | | |
| - Small business | 0.6 (0.9) | 1.8 (2.4) | 1.3 (2.5) |
| - Charity | 0.0 (0.0) | 0.0 (0.0) | 1.3 (2.3) |
| - Local authority | 0.3 (1.6) | 0.0 (0.0) | 1.8 (6.5) |

Second, self-reported domain-specific sitting time was reviewed for each organisation at each time point. This was further broken-down by working day and non-working day.

Table 5.11: Domain-specific sitting time for working days and non-working days for each organisation at each time point

| Domain-specific sitting in mins/day, mean (SD) | T0 | T1 | T2 |
|--|-----------|-----------|-----------|
| Sitting for work on a workday | | | |
| - Small business | 384 (54) | 343 (156) | 330 (104) |
| - Charity | 385 (114) | 387 (85) | 392 (64) |
| - Local authority | 364 (77) | 382 (55) | 389 (54) |
| Sitting for work on a non-workday | | | |
| - Small business | 60 (42) | 81 (157) | 90 (115) |
| - Charity | 98 (181) | 79 (119) | 41 (53) |
| - Local authority | 50 (90) | 76 (120) | 79 (107) |
| Sitting during transport on a workday | | | |
| - Small business | 52 (26) | 68 (37) | 36 (14) |
| - Charity | 71 (40) | 55 (29) | 61 (37) |
| - Local authority | 60 (38) | 58 (39) | 54 (34) |
| Sitting during transport on a non-workday | | | |
| - Small business | 48 (13) | 87 (55) | 68 (15) |
| - Charity | 40 (20) | 33 (18) | 48 (24) |
| - Local authority | 54 (38) | 50 (34) | 66 (42) |
| Television viewing on a workday | | | |

| | | | |
|--|-----------|-----------|-----------|
| - Small business | 96 (89) | 96 (39) | 105 (30) |
| - Charity | 98 (95) | 119 (73) | 150 (62) |
| - Local authority | 125 (75) | 119 (76) | 122 (74) |
| Television viewing on a non-workday | | | |
| - Small business | 132 (50) | 174 (75) | 165 (57) |
| - Charity | 175 (118) | 195 (133) | 163 (100) |
| - Local authority | 195 (98) | 206 (108) | 217 (136) |
| Personal computer use on a workday | | | |
| - Small business | 48 (46) | 22 (25) | 45 (30) |
| - Charity | 52 (49) | 51 (32) | 90 (159) |
| - Local authority | 88 (84) | 59 (56) | 51 (36) |
| Personal computer use on a non-workday | | | |
| - Small business | 102 (103) | 85 (50) | 68 (38) |
| - Charity | 101 (131) | 121 (149) | 129 (242) |
| - Local authority | 120 (103) | 109 (84) | 101 (72) |
| Other leisure time sitting on a workday | | | |
| - Small business | 54 (72) | 69 (29) | 68 (38) |
| - Charity | 48 (28) | 43 (25) | 41 (22) |
| - Local authority | 55 (51) | 70 (60) | 64 (38) |
| Other leisure time sitting on a non-workday | | | |
| - Small business | 198 (161) | 168 (50) | 165 (142) |
| - Charity | 192 (75) | 195 (64) | 158 (45) |
| - Local authority | 167 (109) | 183 (118) | 175 (76) |

Table 5.11 presents the average sitting times in various domains on working days and non-working days for participants in each organisation and at each time point. Sitting for work on a workday was reported to gradually decrease over time for participants in the small business, stay the same for the charity participants and gradually increase for the local authority participants. Sitting for work on a non-workday varied for each organisation over time, but was generally between 60-90 minutes/day. There were no striking differences between the organisations nor any obvious time trends for sitting during transport on either working or non-working days. Television viewing on a workday was lower than on a non-work day for participants from all three organisations. Participants from the local authority tended to sit on average more than participants from the small business and charity during television viewing on non-working days. Personal computer use and other leisure time sitting on both workdays and non-workdays did not demonstrate any clear patterns in the data nor were there any obvious differences between organisations.

Third, self-reported data on general health and wellbeing were taken from selected items from SF36 questionnaire. Table 5.12 shows mean results for each organisation at each time point. Each item is scored on a 0 to 100 range so that the lowest and highest possible scores are 0 and 100, respectively. Scores represent the percentage of total possible score achieved. A high score defines a more favourable health state.

Table 5.12: Self-reported general health and wellbeing for each organisation at each time point

| General health and wellbeing measure | T0 | T1 | T2 |
|--|---------|---------|---------|
| General health rating, % mean (SD) | | | |
| - Small business | 60 (34) | 63 (25) | 69 (13) |
| - Charity | 68 (16) | 64 (18) | 72 (21) |
| - Local authority | 63 (24) | 57 (20) | 58 (21) |
| Role limitations due to physical health, % mean (SD) | | | |
| - Small business | 95 (22) | 80 (41) | 100 (0) |
| - Charity | 95 (21) | 94 (23) | 100 (0) |
| - Local authority | 86 (35) | 75 (43) | 82 (39) |
| Role limitations due to emotional problems, % mean (SD) | | | |
| - Small business | 100 (0) | 70 (48) | 63 (52) |
| - Charity | 86 (35) | 78 (42) | 63 (50) |
| - Local authority | 84 (37) | 79 (41) | 84 (37) |
| Pain, % mean (SD) | | | |
| - Small business | 94 (14) | 70 (41) | 100 (0) |
| - Charity | 89 (14) | 91 (16) | 85 (19) |
| - Local authority | 77 (24) | 72 (29) | 78 (22) |
| Emotional wellbeing, % mean (SD) | | | |
| - Small business | 81 (9) | 56 (36) | 72 (18) |
| - Charity | 75 (20) | 70 (22) | 67 (25) |
| - Local authority | 63 (26) | 66 (25) | 72 (21) |
| Energy/fatigue, % mean (SD) | | | |
| - Small business | 64 (22) | 56 (32) | 72 (13) |
| - Charity | 58 (21) | 52 (22) | 57 (22) |
| - Local authority | 50 (26) | 56 (25) | 60 (23) |

Table 5.12 shows very few differences in terms of changes over time or by organisation. Role limitations due to emotional problems seemed to get worse over time for participants from both the small business and charity, whereas emotional wellbeing gradually improved for participants from the local authority. Energy and fatigue levels also improved over time for the local authority participants.

Finally, self-reported health and work performance was reviewed for each organisation at each time point using selected items from the World Health Organisation (WHO) Health and Work Performance Questionnaire.

Table 5.13: Health and work performance for each organisation at each time point

| Work-related measure | T0 | T1 | T2 |
|--|------------------|--------------------------|------------------|
| Frequency performance perceived as higher than colleagues, median | | | |
| - Small business | Most of the time | Most to some of the time | Some of the time |
| - Charity | Some of the time | Some of the time | Some of the time |

| | | | |
|---|----------------------|----------------------|------------------------------|
| - Local authority | Some of the time | Some of the time | Some of the time |
| Frequency performance perceived as lower than colleagues, median | | | |
| - Small business | A little of the time | A little of the time | A little to none of the time |
| - Charity | A little of the time | A little of the time | A little of the time |
| - Local authority | A little of the time | None of the time | A little of the time |
| Frequency of presenteeism, median | | | |
| - Small business | None of the time | A little of the time | A little of the time |
| - Charity | None of the time | A little of the time | A little of the time |
| - Local authority | None of the time | None of the time | A little to none of the time |
| Frequency not working as carefully as should, median | | | |
| - Small business | A little of the time | A little of the time | None of the time |
| - Charity | None of the time | A little of the time | A little of the time |
| - Local authority | A little of the time | A little of the time | A little of the time |
| Frequency quality of work lower than it should, median | | | |
| - Small business | A little of the time | A little of the time | A little of the time |
| - Charity | None of the time | None of the time | A little to none of the time |
| - Local authority | None of the time | None of the time | None of the time |
| Frequency of poor concentration on work, median | | | |
| - Small business | A little of the time | A little of the time | A little of the time |
| - Charity | A little of the time | None of the time | A little of the time |
| - Local authority | A little of the time | A little of the time | A little of the time |
| Frequency health problems limited work, median | | | |
| - Small business | None of the time | None of the time | None of the time |
| - Charity | None of the time | None of the time | None of the time |
| - Local authority | None of the time | None of the time | None of the time |
| In the last 4 weeks, how many: | | | |
| <i>Full workdays missed due to problems with physical or mental health</i> | | | |
| - Small business | 0 (0) | 0 (0) | 0 (0) |
| - Charity | 0 (1) | 0 (0) | 0 (1) |
| - Local authority | 0 (0) | 0 (0) | 0 (0) |
| <i>Full workdays missed for any other reason (inc holidays)</i> | | | |
| - Small business | 2 (4) | 0 (1) | 1 (1) |
| - Charity | 5 (3) | 1 (1) | 2 (2) |

| | | | |
|--|-------|-------|-------|
| - Local authority | 1 (2) | 2 (3) | 2 (2) |
| <i>Part workdays missed due to problems with physical or mental health</i> | | | |
| - Small business | 0 (0) | 0 (0) | 0 (0) |
| - Charity | 0 (0) | 0 (0) | 0 (1) |
| - Local authority | 0 (0) | 0 (1) | 0 (1) |
| <i>Part workdays missed for any other reason (inc holidays)</i> | | | |
| - Small business | 0 (0) | 0 (0) | 0 (0) |
| - Charity | 0 (1) | 0 (0) | 1 (1) |
| - Local authority | 0 (1) | 0 (1) | 1 (2) |
| <i>Days came in early, went home late, or worked on day off</i> | | | |
| - Small business | 7 (6) | 3 (3) | 2 (3) |
| - Charity | 3 (4) | 1 (2) | 3 (5) |
| - Local authority | 5 (6) | 4 (5) | 2 (3) |

Table 5.13 highlights very few changes in terms of health and work performance over time and few differences by organisation. Very few workdays were missed due to physical or mental health-related issues from participants from all organisations. Participants from all three organisations did report a number of days working extra hours across all time points.

5.6. Discussion

Findings from the outcome evaluation did not demonstrate a consistent reduction in the primary outcome measure of percentage time spent sitting at work. Furthermore, the effect sizes at the various follow-up points and for the different organisations ranged from trivial to medium and the direction of the effects were inconsistent. The results, therefore, suggest that the interventions were ineffective. However, the process evaluation determined that none of the interventions were implemented as intended. This was despite organisation-specific implementation plans being made as part of Phase 2 (see Chapter 4). This lack of intervention fidelity could explain why no reduction in workplace sitting time was observed and demonstrates the importance of conducting process evaluations [81]. In addition, a wide variation in individual-level data was demonstrated. This variation could explain the inconsistent findings relating to effectiveness of interventions in previous trials [59, 118–120] and could be a strong rationale for analysing variation in outcomes alongside overall effectiveness in all forms of evaluation (e.g., RCTs and “before and after” studies).

Several barriers to intervention implementation were reported by participants. Even in the small business, where the context appeared favourable given the MD and majority of staff were fully on board with the

intervention, barriers prevented successful implementation. Contextual barriers reported by participants from all three organisations related to workload pressures (for both participants and implementers) and the social norms that exist in relation to sitting at work. These barriers were reported in Phase 1 (see Chapter 3) and were also identified in a thematic synthesis of factors perceived to influence acceptability and feasibility of reducing sitting at work [160], suggesting these could be common barriers linked to office/desk-based organisations [157]. Organisations may wish to consider how job roles can be redesigned in a way that provides more opportunities for sitting less and moving more at work [52], although both workload pressures and the social norms of sitting are difficult barriers to address without associated widespread cultural changes.

Contextual barriers reported by participants from the larger organisations included the “culture of meetings”, where sitting round a table is the norm, and the lack of protected time (e.g., lunch break) to purposefully plan to sit less at work. The “Sit Less at Work” interventions developed by the charity and local authority volunteers included suggestions to overcome these barriers, such as having standing or walking meetings or incorporating standing or moving into meetings. However, in practice, due to the ingrained social norms of sitting, staff felt uncomfortable participating in or instigating these alternatives to sitting, a finding also reported in previous studies [83, 150, 157]. In addition, the range of job roles/teams within the larger organisations proved to be a barrier to implementation. Some roles, such as those in customer services, were reported to be much more restricted in terms of having the flexibility and autonomy to take regular breaks from sitting [207]. To create a meaningful change in the most sedentary groups of workers, there needs to be a significant change to sedentary working practices [86]. In order to achieve this, it was suggested that “Sit Less at Work” interventions be tailored not only to specific organisations, but also down to the levels of individual teams in larger organisations. This is in contrast to the small business, where the MD reported that they might benefit from a more strategic approach to sitting less at work coming from central government, with additional support or funding available for initiatives such as applications or computer screen pop-ups.

The barriers of workload pressures, the “culture of meetings” and lack of protected time all fall under the broader theme of organisational culture. As described in Phase 1, organisational culture is “a set of collective norms that govern the behaviour of people within the company” [165]. It is this culture which can either promote or undermine attempts to change working practices [150]. A working environment, which is perceived to be supportive for increasing physical activity in the workplace, has been shown to enhance the acceptability of such interventions [208]. However, there is limited evidence relating to the role organisational culture could play in the uptake of interventions to reduce workplace sitting time. A study by Such and Mutrie [150] applied an organisational cultural framework to explore how organisational factors and dynamics impact workplace sitting. This study found that prolonged sitting at work is an outcome of organisational culture. Prolonged workplace sitting is a behaviour, which is constructed as both an ethos (linked to organisational culture) and a social practice (related to the social norms of sitting) [150]. Furthermore, without a formal policy or strategy, the issue of prolonged workplace sitting is not “problematized”, hence organisational values

are not explicit and the norms of sitting prevail. Findings from Phase 3 have highlighted that organisational culture can act to promote the existing social norms of sitting, thereby acting as a significant barrier to workplace sitting interventions. Perceiving sitting as a social practice could support a fuller understanding of the associated social barriers to sitting less at work. For workplace sitting interventions to be implemented successfully, there needs to be some attempt to shift organisational culture, which in turn could help to overcome these socially ingrained barriers.

A contextual barrier specific to the small business related to the issue of staff turnover during and just after the intervention period. The change of one staff member in a small business has more of an impact than in larger organisations, which can absorb such a change more easily. For the small business in this study, there was concern that staff turnover could have had implications for the longer-term sustainability of the intervention, as new staff were not inducted into the “Sit Less at Work” initiative. This could be an issue that small businesses in particular need to consider when planning future workplace sitting (or other health and wellbeing) interventions [209, 210]. One way of addressing this issue could be ensuring that the importance of sitting less at work is highlighted in new starter induction processes.

Another factor specific to the small business was that the intervention content differed to the other participating organisations in that the initiatives were more focused on increasing moderate-to-vigorous physical activity (as discussed in Chapter 4). It was these initiatives that were more successfully implemented rather than those that involved replacing sitting time with light intensity activities, such as standing and walking. This could have been associated with the staff in the small business being predominantly younger males, resulting in the inclusion and uptake of the more traditionally “male-oriented” initiatives, such as the use of dumbbells and attending the gym together outside of working hours, which encompassed a level of competitiveness between the participants [188, 189]. Sedentary behaviour reduction initiatives, such as standing/walking meetings, standing when on the phone and taking regular breaks away from your desk, could appear more “gender neutral” and hence could have been less appealing to the younger males. The gender and age dynamic of an organisation could, therefore, be something to consider when developing and implementing initiatives to reduce workplace sitting time. In the current research, this dynamic was accounted for via the co-production methods used during intervention development.

There were several barriers specific to the larger organisations (the charity and local authority). For instance, both these organisations experienced competing priorities, which meant that the “Sit Less at Work” interventions did not get the attention that they needed to successfully support implementation. The charity was preparing for a large organisational change with a relocation to a new building accompanied by a new way of working – agile working. Although, in principle, the agile working agenda should have complimented the “Sit Less at Work” intervention, the timing of the intervention did not fall at the time this agenda was being pushed by the organisation. Instead, the intervention appeared to just get lost amongst the bigger priorities.

In addition, the local authority had other health and wellbeing initiatives that it was required to focus on and placing too much emphasis and time on one initiative was not how the HR team were accustomed to working. Their health and wellbeing promotion strategies tended to encompass social marketing campaigns, which were short-lived, e.g., over a week, and usually linked in with the timing of a national campaign. However, with an issue such as reducing workplace sitting time, which has so many identified barriers, not least the ingrained social norms, a short-lived campaign is unlikely to result in longer-term behaviour change [211] and what is needed is a shift in organisational culture.

The charity and local authority experienced problems regarding the communications that formed part of their “Sit Less at Work” interventions. Both organisations had existing initiatives in place to reduce the volume of corporate communications, consistent with many large organisations, in an attempt to reduce stress amongst staff [212]. The email communications suggested during co-production were ultimately not deemed to be feasible by senior management since it did not fit with overarching organisational priorities. Therefore, the emails were changed to other communication methods, such as posts on the local intranet and monthly bulletins. The fact that this initiative was not considered to be feasible by senior management was of particular interest, as the purpose of using co-production was to develop interventions that were practical and feasible and tailored to the needs of staff in that organisation. This issue highlights the importance of ensuring senior management are involved in the intervention development and implementation processes. However, this needs to be carefully considered, as, if staff suggest changes which are subsequently amended or removed by senior managers, this could leave staff feeling disempowered and result in disengagement from the process [213]. In addition to the changes in the method of communication, the local authority faced further issues relating to dissemination of the communications. It was intended that the communications would be sent via the communications team rather than the implementer. However, due to a lack of buy-in from the communications team and a subsequent restructure of the team, which is known to lead to poor staff morale and performance [214], the intervention communications were not prioritised.

Participants from the larger organisations reported issues with lack of management and organisational-level buy-in for the interventions, which could have contributed to the lack of intervention fidelity. This was compounded by the fact that only one implementer was identified in both the charity and local authority to successfully implement the interventions. These issues highlighted that the larger organisations did not display appropriate “readiness for change”, defined as,

“The extent to which targeted employees (especially the implementers) are psychologically and behaviourally prepared to make the changes in organisational policies and practices that are necessary to put the innovation into practice and support innovation use” [153].

A more collaborative approach driven by both managers and staff could have resulted in greater engagement and enhanced the organisations’ readiness for change [66, 135, 153]. Furthermore, having advocates or champions within these organisations could have supported the implementation process [150]. As highlighted

in the integrative review presented in Chapter 2, workplace champions have been found to promote intervention messages and create a supportive culture within the organisation to aid change [139], to advocate for the allocation of resources and influence organisational policy targeting workplace sitting [137]. This idea of champions was identified by Rogers' in his Diffusion of Innovations theory [215], which broadly aimed to explain how, why and at what rate new ideas, innovations or interventions spread or are taken-up by the target population. The theory highlights that successful diffusion and implementation of an intervention is supported by peers serving as role models leading to the subsequent imitation of the new behaviour (sitting less) by potential adopters [215]. To support the collaborative approach, champions would need to include both high-level management representatives as well as other enthusiastic staff members.

An identified barrier specific to the local authority related to the idea of individuals taking responsibility for their own behaviours. It was reported by key personnel that a behaviour change, such as sitting less at work, should primarily be the responsibility of the individual or at least the team managers rather than a corporate responsibility. This is consistent with findings from a previous study, which examined organisational culture in relation to promoting the health of staff and students in two contrasting universities in the UK; one with a healthy university initiative in place and one without [216]. This focus on individual responsibility could have been as a result of a shift in the organisational culture of local authorities; from the traditional "command and control" leadership style with a top-down hierarchical structure to more of a self-leadership style where staff manage their own behaviours to meet the standards and objectives of the organisation [217]. However, the difficulty with self-leadership in this context is that unless there are some higher-level corporate changes to the way the organisation is run, for example addressing the "culture of meetings" and social norms of sitting, it makes it very difficult for individuals to change their sitting behaviours. Organisations need to create a strong implementation climate to enhance staff's means, motives and opportunity to make use of the intervention [153].

[Implications for research and practice](#)

The findings from Phase 3 suggest that there is a need to support organisations that varied in terms of size and sector differently when implementing interventions to reduce workplace sitting. Smaller businesses could require more strategic, external support with some intervention elements being more prescriptive, such as the use of computer pop-ups, applications or standard "sit less" messaging. Larger organisations could benefit from: more bespoke action plans for individual teams/departments, which may experience different barriers and enablers to sitting less at work; different modes of communications when promoting the intervention, i.e., not emails; and more support in terms of implementation, i.e., having more than one implementer in the organisation and using workplace champions. Furthermore, in the larger organisations, having more integrated management buy-in will help to ensure that the "grass-roots" intervention can be adequately operationalised, although this needs to be carefully balanced so as to not disempower staff [213]. For all types

of organisations, there needs to be a formal policy or strategy, which explicitly highlights the importance of sitting less at work to support staff to break the ingrained social norms of sitting at work. In addition, including this policy in the induction processes for new starters will help with the long-term sustainability of the intervention.

Implementation of interventions to reduce workplace sitting time is complex, hence evaluations of such interventions should include a process evaluation to support any assessment of intervention effectiveness [76]. Future research may wish to consider how job roles can be redesigned in a way that provides more opportunities for sitting less and moving more at work [52], although both workload pressures and the social norms of sitting are difficult barriers to address without associated widespread cultural changes. Researchers should also take into account gender and age dynamics of an organisation when developing and implementing interventions to reduce workplace sitting (as well as other workplace health initiatives). This could be achieved by following a co-production methodology. Finally, future research could take into account any contextual factors which may present as competing priorities, and consider focusing on how to alter organisational culture by challenging the social norms of workplace sitting in order to successfully implement such interventions.

Strengths and limitations

Phase 3 has a number of strengths. Firstly, both objective and subjective measures of sitting time were taken from participants. Taking an objective measure of sitting time has been recommended as subjective measures alone are associated reporting and recall biases [71]. Secondly, three data collection points were used, which provided an assessment of longer-term follow-up and intervention sustainability. Thirdly, the fact the interventions were implemented with minimal researcher involvement reflects the real-world nature of this study and helps to enhance external validity. Finally, the use of mixed-methods as part of a process evaluation supported the interpretation of the outcome evaluation findings [81]. Without the process evaluation, it would have not been possible to understand whether the outcome evaluation findings were as a result of the interventions being ineffective or due to poor implementation.

Phase 3 also had some limitations. Firstly, as highlighted in Table 5.1, participants generally displayed healthy lifestyle behaviours meaning there was a degree of selection bias as a result of the convenience sampling methods used. However, as this study aimed to assess the feasibility of the interventions and not undertake hypothesis testing, it was felt that the participants would still be able to provide a useful account of the issues. Secondly, the number of participants recruited to the study was relatively small and this factor, coupled with the selection bias, meant that the samples were unlikely to be representative of all staff in the participating organisations. Relatedly, a common limitation to qualitative research is the lack of generalisability of the findings. Nonetheless, the qualitative findings across the organisations from this study were broadly in line

with a previous review, which assessed the feasibility and acceptability of interventions to reduce workplace sitting [160].

5.7. Conclusion

There was no consistent reduction in sitting time observed in any of the participating organisations, suggesting that the co-produced “Sit Less at Work” interventions were ineffective. However, process evaluation found that none of the interventions were implemented as intended thereby threatening intervention fidelity. Despite attempting to address the existing barriers and enablers to sitting less at work (as determined in Phase 1) and the use of co-production techniques during intervention development (Phase 2), the interventions still had significant barriers to implementation. A range of contextual and organisational cultural barriers were identified, which included: workload pressures and the social norms of sitting (present in all three organisations); staff turnover (present in the small business only); issues relating to the organisational characteristics and perceptions of where the responsibility for behaviour change should come from (present in the local authority only); and competing priorities, issues relating to intervention communications and lack of management buy-in (present in both the charity and local authority).

Key findings from Phase 3 focussed on the need for greater support when implementing interventions to reduce workplace sitting time. Support could be gained from a greater level of buy-in from senior management, ensuring the “right people” (i.e., decision-makers) in the organisation are involved in intervention implementation, having more than one implementer, and involving workplace champions. Although these findings would support the successful implementation of interventions, the overarching finding of Phase 3 related to the importance of organisational culture. The prevailing culture of an organisation can promote existing social norms, which in turn can hinder the implementation of workplace sitting interventions. The idea that sitting is a social practice influenced by the organisational culture suggests that further understanding of social barriers to sitting less is needed. Changes to organisational culture could be required prior to intervention implementation to support successful implementation. The development of a formal policy or strategy, which explicitly identifies prolonged sitting at work as an issue, is one step towards a change in organisational culture. However, changes would also need to be at a deeper organisational level, requiring buy-in from all levels of management and staff, to shift organisational culture and associated social norms.

Chapter 6: Discussion and conclusion

6.1. Chapter summary

This chapter discusses the findings from the integrative systematic review and the three phases of this PhD research programme in order to highlight the key contributions of this work. First, this chapter briefly summarises the work that has been conducted. Second, it refers to the secondary research questions, as laid out in the introductory chapter, and answers each in turn based on the findings of this research. Third, it explores how the key findings addressed the primary research question: “What is the role of organisational context on the development, implementation and evaluation of interventions to reduce workplace sitting time?”. This discussion focuses on the barriers reported in Phase 1 and 3, which related to several different factors that influenced organisational context, namely: organisational culture; social factors; organisational characteristics; the internal environment; and wider economic and political factors. A further factor related to the external environment and the significant impact this can have on working practices. This was not highlighted by participants during the research, but has since been identified during informal discussions with contacts from the participating organisations in relation to the impact of the COVID-19 pandemic. Fourth, implications for research and practice are explored. Fifth, based on the key findings and implications for future research, a refined version of the operational framework (developed in Chapter 2) is presented. Sixth, some reflections on the relevance of the overall research findings in the context of the on-going COVID-19 pandemic are considered. This is then followed by final conclusions to highlight the key findings along with the main empirical, theoretical and methodological contributions of the research presented in this thesis.

6.2. Summary of the work undertaken during this PhD research programme

This PhD research programme primarily aimed to explore contextual factors that influence the development, implementation and evaluation of interventions to reduce workplace sitting in organisations of different size and sector. A secondary aim was to develop, test and refine an operational framework for the development, implementation and evaluation of workplace sitting interventions. In order to achieve these aims, first, an integrative systematic review was undertaken to establish the current evidence base in relation to the intervention effectiveness and determine key considerations for the development and implementation of such interventions. The findings from this review then led to the production of an operational framework to support intervention development, implementation and evaluation. Second, informed by the operational framework, a qualitative study was undertaken to assess the existing barriers and enablers to reducing workplace sitting in organisations of different size and sector and to compare and contrast the findings across

these different organisations (Phase 1). Third, co-production techniques were used to develop and plan the implementation of “Sit Less at Work” interventions tailored to the specific context of four participating organisations, which varied in terms of size and sector (Phase 2). The use of co-production also allowed for the barriers and enablers identified in Phase 1 to be addressed. Fourth, these interventions were implemented as part of a “before and after” intervention mixed-methods feasibility study and underwent pragmatic process and outcome evaluations (Phase 3). Throughout this research programme, ideas and suggestions from the public involvement panel were integrated into the research and helped to inform the procedures and research methods used.

6.3. Summary of the key findings from this research programme

A summary of the key findings from this research is provided as answers to the secondary research questions (as outlined in Chapter 1). The primary research question is discussed in detail later in this chapter (see Section 6.4) as it was addressed by collating and integrating findings from all three phases.

6.3.1. Based on existing evidence, which interventions are effective at reducing workplace sitting time?

The quantitative part of the integrative systematic review reported in Chapter 2 determined that the effectiveness of interventions to reduce workplace sitting time was extremely varied. However, in the short-term, sit-stand desks, used either alone or as part of a multicomponent intervention, demonstrated some degree of effectiveness. A barrier to investing in sit-stand desks is the high upfront costs which, in practice, could act as a barrier to uptake amongst many employers [59, 66, 117, 137]. Detail on the cost-effectiveness of such interventions, therefore, require further attention. There was no clear evidence regarding the effectiveness of lower-cost interventions. Sit-stand desks have the advantage of staff being able to replace their usual seated work with standing, whereas the lower-cost interventions tend to focus on breaking-up sitting time, e.g., using prompts to move away from desk and to take regular breaks from sitting. Therefore, Interventions that aim to break-up sitting time could not achieve the same levels of change in sitting time as interventions that replace seated work with standing and hence, the interventions appear less effective. There were some alternative intervention components that replace seated work but do not require sit-stand desks, such as walking or standing meetings. Nevertheless, as these intervention components were not tested alone, this systematic review was unable to determine their effectiveness. Furthermore, as process evaluations were scarcely reported, it is unclear whether interventions were implemented as intended in the various settings.

6.3.2. What are the key considerations for the development and implementation of interventions to reduce workplace sitting?

The findings from the qualitative part of the integrative systematic review (reported in Chapter 2 and published [106]) determined key considerations for the development, implementation and evaluation of interventions to reduce workplace sitting. Key considerations that were found to be important for intervention development included: engagement with employees and managers to understand the barriers and enablers to sitting less at work; and identifying and using an appropriate theoretical model or framework to operationalise intervention strategies. Ensuring the intervention is supported by management and aligns with local policies or strategies was identified as an important step during intervention implementation. Considerations important for intervention development and implementation included: using participatory or collaborative approaches involving both managers and employees; conducting a pilot or feasibility study within the target organisation prior to a full-scale roll-out; and developing and implementing an action plan tailored to the needs of the employees and organisation, which provides a menu of strategies, targets multiple levels of influence, involves workplace champions, is low-cost, and involves strategies that both interrupts and replaces sitting with standing or moving. Key considerations which were important for intervention evaluation included the undertaking of both a process and outcome evaluation. Finally, one consideration which underpinned intervention development, implementation and evaluation related to taking account of real-world contextual factors including local organisational issues as well as wider policy issues and to ensure that these issues were reported in detail to aid knowledge translation.

These range of considerations make it clear that a “one-size fits all” approach to reducing workplace sitting is not appropriate. Therefore, these findings were translated into an operational framework to support the development, implementation and evaluation of such interventions (see Chapter 2, Figure 2.2, findings published [106]). This framework was then tested in the subsequent phases of the research.

6.3.3. What are the barriers and enablers to reducing workplace sitting time?

A range of barriers and enablers were identified during the qualitative study reported in Chapter 3 (findings published [107]). Overall, four major influencing factors were identified: individual factors; organisational factors; the internal physical environment; and the broader social, economic and political context. These factors were found to be consistent with both the ecological model of sedentary behaviour [161, 162] and findings from a similar review conducted by Hadgraft et al. [160]. Within these major influencing factors were specific barriers and enablers to reducing workplace sitting. Individual-level factors were reported to include: habits and routines; personal motivations and preferences; and concerns about distracting colleagues. Organisational-level factors encompassed: the nature of work; organisational culture; organisation size; and ways of working. Factors relating to the internal physical environment were identified as: the building location, facilities and layout; the idea that the workplace was designed for sitting; and the existing equipment

and furniture. Finally, factors associated with the broader social, economic and political context included: the idea that sitting is the social norm and standing is counter normative; presenteeism; and wider economic and political issues. These specific barriers and enablers were also broadly consistent with the review findings by Hadgraft et al. [160]. Phase 1 extended the review by Hadgraft et al. [160] by also exploring whether there were any differences in perceived barriers and enablers based on organisation type, such as differences by sector and size, which was needed to fully understand how much of an influence such contextual factors have on the effectiveness of interventions.

6.3.4. Do these barriers and enablers differ between organisational contexts?

Some of the barriers and enablers identified above were similar across the organisations which participated in Phase 1 including: habits and routines; personal motivations and preferences; the nature of work; building location, facilities and layout; the fact that the workplace is designed for sitting; and the idea that sitting is the norm and standing is counter normative. In general, these similarities related to the inevitable constraints of office-based work. However, some of the identified barriers and enablers did vary between organisational contexts.

Differences between organisations primarily related to organisational factors and the internal physical environment. In particular, there were clear differences reported in relation to organisational culture. For example, participants from the local authority reported a lack of support from managers to sit less at work with a perceived pressure to be seen to be sitting at their desks working. In contrast, participants from the small business and large corporation highlighted support that they gained from managers as an enabler for sitting less at work. The lack of management support could be dependent on the personalities of individual managers or it could be a symptom of an ingrained management ethos related to the culture of the organisation [165]. In addition, barriers relating to lack of time and workload pressures were reported by participants from the local authority and large corporation. Participants from the charity reported that the need for a reason to move acted as a barrier. Participants from the small business felt that the size of the organisation was both a barrier, in terms of lack of funding for workplace health promotion initiatives, and an enabler due to “close-knit” peer support.

The concept of presenteeism was found to be a strong social barrier to sitting less in the local authority and charity. In this study, presenteeism related to the idea that being sat at your desk and being contactable meant you were undertaking work regardless of whether or not any work was actually being done. This interpretation of presenteeism acts as a barrier to sitting less, as taking regular breaks from sitting is perceived to equate to taking regular breaks from working. The idea that sitting is essentially what “work” is for employees with sedentary jobs could mean that changes that involve redefining “work” could support employees to sit less.

Homeworking was reported by participants from the charity and local authority as an enabler to sitting less due to the added flexibility and convenience [167]. However, some participants from the local authority also reported stigma associated with homeworking (i.e., being perceived by colleagues as “slacking” therefore, to counter this, needing to be always available), which links in with the concept of presenteeism as determined by this research. The issues relating to homeworking are even more pertinent as a consequence of the COVID-19 pandemic and associated restrictions on office-work that have been put in place in the UK and is an issue which needs further exploration.

Finally, wider economic and political issues were raised only by the local authority participants. Being a publicly funded organisation with on-going funding cuts and external political pressures, staff felt the need to be visibly working (i.e., being sat at their desks) in order to demonstrate their need.

6.3.5. Is co-production a feasible way to develop interventions to reduce workplace sitting?

The co-production process used in Phase 2 (reported in Chapter 4) was guided by the operational framework and included two workshops for each participating organisation. The first workshop used a variety of creative-thinking activities, and a theoretical model (ecological model of sedentary behaviour [161]) to support the structure of these activities. The second workshop refined the ideas from the initial workshop into practical suggestions, which formed a final intervention. Four “Sit Less at Work” interventions (one for each participating organisation), which targeted multiple levels of influence, were developed as a result of the co-production process. However, some actions suggested during co-production were not deemed feasible by senior management, so had to be amended or removed from the intervention. Volunteers from all four participating organisations provided positive feedback relating to the techniques used and the format of the two intervention development workshops along with some suggestions for improvement which were incorporated into workshops in subsequent organisations. The fact interventions were developed and the positive feedback received for the intervention development process demonstrated that co-production was a feasible method to develop interventions to reduce workplace sitting.

6.3.6. How does the intervention content differ between workplace settings?

The four “Sit Less at Work” interventions were inevitably different as the content was tailored to the needs of each organisation. This was most notable in the small business, where volunteers produced an intervention that encompassed more actions that: incorporated physical activity, e.g., having ping pong and press-up competitions; involved technology, e.g., the use of computer prompts; and required the purchase of some equipment, e.g., the use of dumbbells and wireless headphones. A possible reason for the intervention content for the small business being so different could relate to the organisation size and sector. As it was a small organisation in the private sector, it was more straightforward to plan and implement innovative strategies and purchase small amounts of equipment without levels of bureaucracy, which could be faced by

the larger organisations [186, 187]. In addition, the staff were mainly young males which could explain some of the more “male-oriented” strategies, which included a level of competitiveness [188, 189], e.g., press-up competitions.

There were also a number of similarities between the four interventions, which were consistent with previous studies [61, 64, 85, 122], such as:

- Communications about the project were to come from someone senior in the organisation to give staff “permission” to participate
- The inclusion of “sitting less and moving more” into health and wellbeing policies also to provide staff with “permission”
- A range of individual-level/team-based actions, e.g., drinking more water to prompt more breaks, holding standing or walking meetings, encouraging lunchtime walks
- Incorporating the tracking of step counts to form a competition or to gain a personal achievement.

6.3.7. Is it feasible to implement interventions in different organisational contexts with minimal researcher involvement?

Only three of the four “Sit Less at Work” interventions were implemented. The large corporation dropped out of the study at the implementation stage. As no further data could be collected on the reasons for dropping out, it is difficult to know why staff were no longer willing to participate. Possible explanations could have been lack of capacity amongst staff volunteers, lack of management support, and lack of interest at the intervention development stage.

Implementation of remaining three “Sit Less at Work” interventions in Phase 3 (reported in Chapter 5) was primarily the responsibility of the named contacts for the charity and local authority and individual staff members for the small business. Despite organisation-specific implementation plans being made as part of Phase 2 (see Chapter 4), none of the interventions were implemented as intended. This suggests that even when the intervention is tailored to the specific needs of the staff in that organisation and has secured organisational approval, implementation requires further consideration and planning. More extensive researcher involvement in the implementation process could have increased intervention fidelity. However, this then limits external validity, making the researcher part of the intervention, which would not translate to the real-world.

There were several barriers to implementation, which were reported as part of the process evaluation, and would need to be overcome in order to successfully implement similar interventions. Barriers reported by participants from all three organisations included workload pressures (for both participants and intervention implementers) and the social norms that exist in relation to sitting at work. However, there were also some barriers which differed by organisation size and sector. Participants from the larger organisations reported: a

“culture of meetings” (linked to the social norms of sitting); the lack of protected time (e.g., a lunch break) to purposefully plan to sit less; the range of job roles/teams with some roles being much more restrictive in terms of having the flexibility and autonomy to sit less at work; competing priorities meaning the interventions did not get the attention they needed to support implementation; issues with the planned email communications, as this did not fit with organisational priorities of reducing the volume of corporate communications; and lack of management and organisational-level buy-in. Furthermore, an issue identified by the key personnel in the local authority related to the idea that sitting less at work should be the responsibility of individual staff members or team managers rather than be a corporate responsibility. Participants from the small business also reported a specific barrier due to staff turnover, which had implications for the longer-term sustainability of the intervention.

All organisations implemented some of the intervention components. In the small business (which implemented more of its intervention than the other organisations), an enabler to intervention implementation appeared to be the use of “male-oriented” initiatives, which involved increasing physical activity (rather than focusing on sitting less) and seemed to appeal more to the younger male staff [188, 189]. Many other of the intervention initiatives for the small business were partially implemented, i.e., were initiated but “fizzled out” over the 12-week roll-out period. In the charity, the clear office/desk policy was implemented, but this was an organisational priority prior to the “Sit Less at Work” intervention and hence had a separate implementation plan. In the local authority, none of the initiatives were fully implemented. Both the charity and local authority sent some communications regarding the intervention, but not as regularly as originally intended. There were some intervention initiatives that iteratively developed during the roll-out period. For example, boxing at work and taking part in physical activity outside of the workplace (small business), and the use of prompts in meeting rooms and near printers/photocopiers with ideas for stretches staff could do whilst waiting (local authority). As the primary researcher had only minimal involvement in the implementation of the interventions, these additional initiatives were only identified during the process evaluation.

6.3.8. [Is it feasible to evaluate interventions using a variety of quantitative and qualitative measures in different organisational contexts?](#)

Process and outcome evaluations were conducted during Phase 3 (see Chapter 5). The evaluations included the use of objective (activPAL3 devices) and subjective (logbooks and online questionnaires) quantitative measures, as well as focus groups and interviews. There were no major issues identified with the evaluation methods and participants deemed the outcome measures used to be acceptable. Minor issues with the evaluation methods included: workload pressures restricted time given to completing the questionnaires, concerns about accuracy when completing the questionnaires, forgetting to complete the logbook, and problems with the dressings used to adhere the activPAL3 devices.

6.4. What is the role of organisational context on the development, implementation and evaluation of interventions to reduce workplace sitting time?

The findings from the current research highlight the challenge of embedding interventions to reduce workplace sitting time into organisations of different size and sector with limited researcher involvement. Despite following the operational framework (see Chapter 2, Figure 2.2) when developing, implementing and evaluating the “Sit Less at Work” interventions, none were implemented as intended. This could suggest that there was a problem with intervention development (e.g., the intervention was not feasible) or implementation (e.g., there were significant barriers which had not been identified and/or addressed). The lack of intervention fidelity highlights the importance of conducting a mixed-methods process evaluation in conjunction with an evaluation of outcomes.

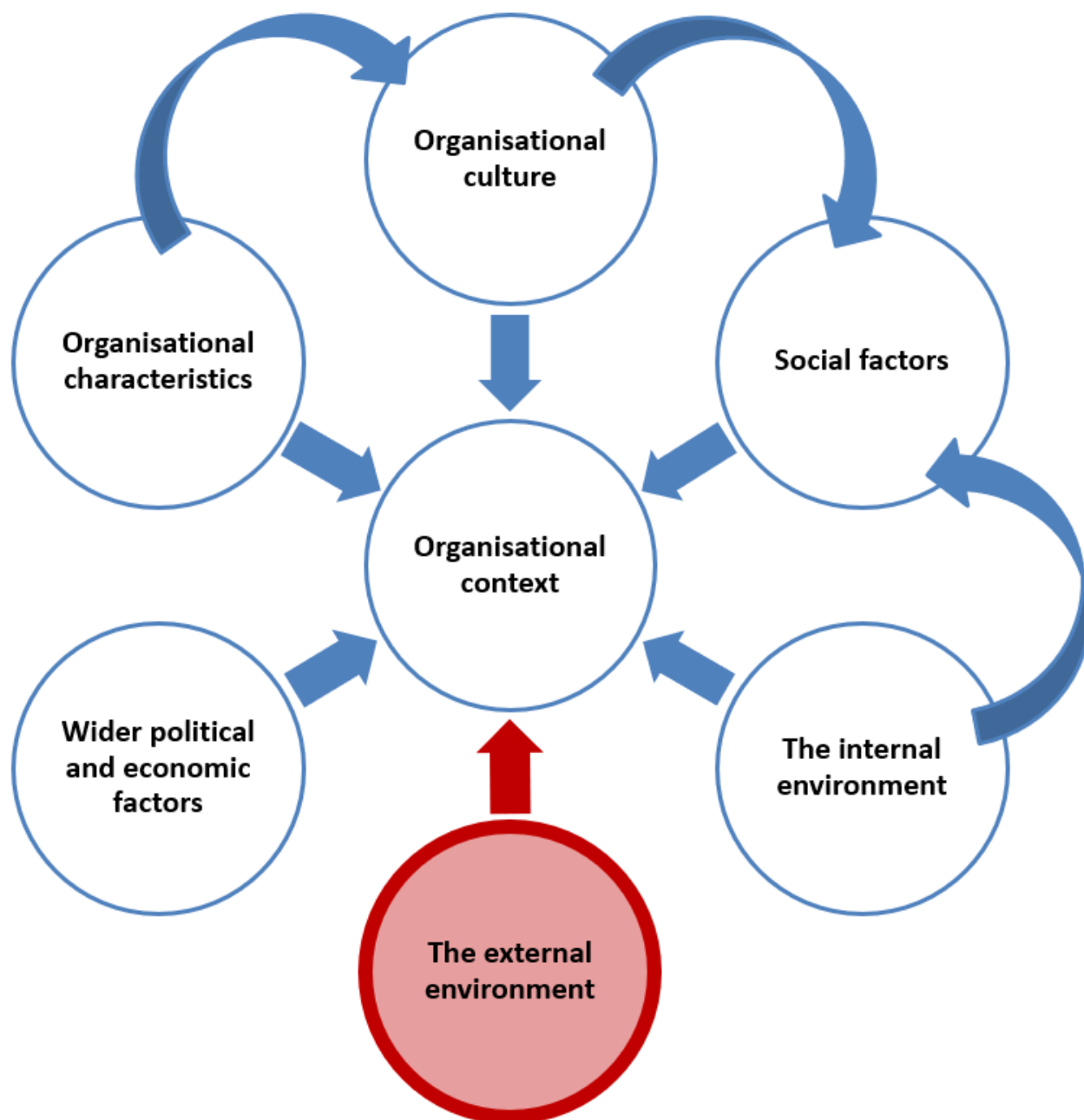
In line with the operational framework, the interventions were developed using co-production techniques to: ensure they were tailored to the needs of staff in each organisation; ensure the actions were feasible for implementation in that organisation; and address barriers that had been identified in Phase 1. Furthermore, the use of co-production/a participatory approach is recommended in MRC guidance for the development and evaluation of complex interventions [84] and has been demonstrated to be an important part of the intervention development process in previous “sit less, move more” studies [64, 85, 218]. In the larger organisations, an issue with development could have been that only the needs of those who volunteered for the intervention development group were included. However, this is less likely to have been an issue in the small business as most of the staff were involved in the intervention development process. Participants from the local authority and charity suggested initiatives that were less innovative than the small business. This could have been due to the awareness of additional “red-tape” that faces publicly funded organisations, which limited their creativity. In addition, only the small business included senior management in the intervention development process, whereas the larger organisations only included staff members with no “decision-makers” present. This could explain why participants from the local authority and charity suggested initiatives that were not deemed to be feasible by senior managers and, hence, could not be implemented or required amendments. For purposes of supporting the implementation, involving senior managers in the intervention development process would be recommended. Despite the issues, participants involved in the intervention development provided positive feedback on the process, with only minor suggestions for improvement.

An important outcome of this research was a better understanding of the challenges relating to the implementation of the interventions. The research has reported a range of barriers to implementation (described in detail in Chapter 5 and summarised in Section 6.3.7). Barriers related to several different contextual factors and hence can be used to explain what role organisational context has on intervention development, implementation and evaluation. As previously described in Chapter 2, effectiveness studies have provided limited insight into the contextual factors that could influence behavioural change during

interventions aimed at reducing workplace sitting time [106, 160]. However, the findings from the current research have shown some clear differences reported by organisation particularly in relation to: pre-intervention barriers and enablers to sitting less at work, the intervention content, and the barriers and enablers to implementing the interventions. These findings demonstrate the uniqueness of organisations and that the organisational context should be considered when developing such interventions [219].

Figure 6.1 highlights the key contextual factors that the current research has found influence workplace sitting time interventions, namely: organisational culture; social factors; organisational characteristics; the internal environment; and wider economic and political factors. A further factor related to the external environment, which, at the time of conducting this research, was not an issue highlighted by participants. However, this has since been identified during informal discussions with named contacts from the participating organisations in relation to the COVID-19 pandemic and the impact that this has had on working practices. Furthermore, it should be noted that many of these factors are not mutually exclusive and demonstrate important associations (see Figure 6.1).

Figure 6.1: Summary of contextual factors identified in the current research that influence workplace sitting time and the development, implementation and evaluation of interventions



Note: “The external environment” is highlighted in red as does not relate to findings directly from the current research but has been included after informal discussions with contacts in the participating organisations

6.4.1. Organisational culture

One of the most prominent themes relating to organisational context was the difference reported in organisational culture, described in previous chapters as “a set of collective norms that govern the behaviour of people within the company” [165]. Organisational culture varied by organisation, but was reported as a barrier and/or enabler to sitting less at work by staff in all four participating organisations prior to the development and implementation of the “Sit Less at Work” interventions. Furthermore, organisational culture

was a reported barrier to intervention implementation particularly for the larger organisations. Barriers to sitting less at work that were associated with organisational culture included: workload pressures; lack of protected time; competing organisational priorities; stigma associated with homeworking; lack of management support; and senior management perceiving the issue to be an individual's responsibility (local authority-specific issue). An enabler to sitting less at work reported by participants from the small business was the presence of management support.

Management support was a key issue as it led to the perceived permission staff needed to feel able to sit less at work. A recent qualitative study by Chau et al. [220] examined manager and employee perspectives on workplace physical activity-related policies and practices in organisations from a range of industry sectors. The study demonstrated that the way senior managers influenced perceptions was through their own actions and behaviours, by acting as role models or champions for change at work and leading by example. This emphasises the importance of gaining management buy-in and engagement during the development and implementation of interventions to reduce workplace sitting time. Furthermore, the study by Chau et al. [220] highlighted a tension between where the responsibility for such a behaviour change should lie; with the individual or the organisation. Chau et al. [220] found that employers are generally moving towards facilitating healthy behaviours and encouraging employees to be more actively involved. However, findings from the current research highlighted that some organisations still perceive staff health behaviours to be down to personal choice. Promoting sitting less (and other health initiatives) at work needs to be a joint endeavour with responsibility at all levels of management and across the organisation [153, 220].

As organisational culture was such a frequently cited barrier to the implementation of the interventions for the larger organisations, changes to organisational culture could be considered prior to, or as part of, the implementation of such interventions [150]. This could also be the case for other workplace health promotion initiatives [219]. A recent review revealed that employee behaviour change was low if the behaviour was considered a low priority by the organisation [219]. If the behaviour change was a perceived priority, then this was found to be linked to an organisational culture that was more accepting of health promotion more generally [219]. The role of organisational culture in terms of what is perceived as normal behaviour could play an important part in future intervention development [221].

To address the importance of organisational culture, it has been suggested that an organisational cultural framework be applied when developing interventions to reduce workplace sitting [150]. Schein's model of organisational culture [222] identifies three levels of culture: (1) artifacts (visible and feelable structures and processes, observed behaviour); (2) espoused beliefs and values (ideals, goals, values, ideologies); and (3) basic underlying assumptions (unconscious, taken-for-granted beliefs and values). When considering workplace sitting, interventions could address each of the three levels in order to promote a more supportive "sit less" culture [150]. The participating organisations in the current research were broadly supportive of staff sitting

less at work, but this was implicit support based on the fact the senior leaders had agreed to participate in the project. However, it could be important to develop a formal policy, which explicitly identifies sitting less at work as an organisational priority [150, 157], to act as a visible process (as per Schein's first level of culture [222]). In addition, engaging workplace champions [139] or having senior leaders acting as role models [83] to sit less at work could motivate peers/staff, which in turn could assist in altering the organisational culture at all three levels as described by Schein [222].

6.4.2. Social factors

A further prominent organisational contextual theme, which recurred throughout this research, related to the social factors associated with sitting at work. Phase 1 emphasised that sitting was the social norm when at work, which was consistent with findings from a thematic synthesis of factors perceived to influence acceptability and feasibility of reducing sitting at work [160], suggesting that this could be a common barrier linked to office/desk-based organisations [157]. Phase 1 also determined that breaking that social norm was problematic, as it was perceived to alter interactions with colleagues and make you "stand out". Furthermore, there needed to be an excuse to be breaking the social norms, e.g., standing due to back pain, or taking purposeful or productive breaks from sitting, e.g., taking a comfort break, making a drink or going to see a colleague. This need for a reason to violate the social norm also links to the concept of presenteeism, described in this research as "sitting at your desk is what work is". The idea that sitting is more than a social norm but essentially being what "work" is for employees with sedentary jobs seems on the one hand inevitable (sedentary jobs equate to sitting at work) [154, 155], but on the other hand a relevant insight when considering what might be needed to make the workplace less sedentary. Changes that involve redefining "work" could support employees to sit less. This could explain why sit-stand desks are so frequently selected to form part of an intervention, as alternative, lower-cost strategies often promote time away from the desk (e.g., making a drink/going to the bathroom more regularly, or visiting colleagues at their desks) [160].

A lower-cost alternative to standing desks, is to stand or move during meetings. However, findings from Phase 3 demonstrated that staff felt uncomfortable instigating such strategies due to the ingrained social norms of sitting, despite the fact that staff volunteers had suggested these strategies as part of the co-production process. In theory, staff felt able to overcome the social norms of sitting, but in practice it was more challenging. Even when meeting rooms were set-up for standing meetings, they would quickly get changed back to the seated set-up. This psychological discomfort was also reported in a recent qualitative study by Mansfield et al. [83], which asked office workers to stand in meetings and then explored their experiences. This study found that the feeling of discomfort was primarily due to being perceived to be violating the social norms of sitting and "standing out" from others [83]. In addition, participants described that, despite wanting to stand, they ceased their attempts early in order to conform to explicit or implicit social pressures [83]. Where standing would more strongly counter the sitting norms, e.g., larger, more formal meetings, or

meetings where sensitive issues were discussed, then this resulted in participants feeling more awkward or even that they could be perceived as challenging authority [83].

Findings from Phase 1 demonstrated that multiple levels of influence were important when considering sitting less at work, and this was in line with influences identified by the ecological model of sedentary behaviour [161, 162]. Due to the need to consider the broader influences, the ecological model of sedentary behaviour was used as the theoretical basis for the development of the “Sit Less at Work” interventions for the current research. The research identified that, along with factors related to organisational culture, the social factors appear to be extremely important in determining whether an intervention to reduce workplace sitting time can be implemented and/or adopted by participants. It is due to the use of the ecological model and in-depth exploration of factors affecting implementation that has led to the suggestion that sitting be viewed as a social practice.

The idea of social practice and the development of social practice theory has gained traction due to criticisms in the way public health interventions were addressing the prevention and management of non-communicable diseases, e.g., cardiovascular disease, type 2 diabetes and some cancers. Much public health research and practice focuses on persuading individuals to change behaviours to reduce their chances for developing non-communicable diseases [223]. However, this method does not take into account routines, habits and accepted ways of living, which can be more difficult to change [223]. Most behaviour change models (such as the Transtheoretical Model and Theory of Planned Behaviour) assume that individuals are capable of using information given to them to make healthy choices with the aim of improving their wellbeing [223]. Social practice theory focuses on the action being performed rather than the individual performing and considers,

“...the patterning of daily lives (and their implications for health) as outcomes of the co-ordination and synchronisation of social practices which persist over time and space, and which are reproduced and transformed by those who carry them” [223].

Focusing on social practices allows more complex relationships and processes, that are often obscured by the traditional view of individual behaviour change, to be highlighted [223]. Rather than the individual being the “unit” of research, social practice theory places the *practice* at the centre of analysis [224]. Social practice theory suggests that enacting social practices, e.g., sitting at work, involves the active integration of three elements: (1) materials (e.g., desks, workplace facilities, the body itself); (2) competence (e.g., awareness of the situation, knowledge, having the time); and (3) meanings (i.e., the social and symbolic significance of sitting at work at any one moment and past experiences) [225].

Considering sitting at work as a social practice could provide more insight into the complex and multifactorial influences on this activity and hence help to identify strategies to enact change. Although social practice theory has predominantly been utilised to understand environmental change interventions [226–229], a recent qualitative study used the theory to explore influences on sedentary behaviour amongst older adults in

Scotland [230]. This study found that using the social practice theory enabled a deeper understanding of the multifactorial and inter-relational factors that influence older adults' sedentary time, determining that many sedentary activities are embedded in their daily lives and hence could be difficult to change [230]. Further, this study was able to add to understandings of the type, context and role of sitting activities in the daily lives of older adults and provide insight into how these might be used to inform interventions to help older adults to sit less [230].

Whilst the development of the "Sit Less at Work" interventions did not utilise social practice theory, the findings from this research highlighted that sitting at work was an embedded practice and even when interventions were co-produced and tailored to the needs of staff, this was not enough to overcome this practice. In addition, the current research found that organisational culture further reinforced the social practice of sitting by contributing to sitting less at work barriers (e.g., workload pressures, lack of protected time, competing organisational priorities and lack of management support), which in turn influenced the "meanings" element of social practice by highlighting the significance of sitting. Conversely, it could be possible to disrupt the practice if organisational culture works to enable sitting less at work. For example, (as highlighted in Section 6.4.1) organisations could explicitly promote sitting less at work using formal policy, or senior leaders and managers could lead by example and act as role models to staff [83]. It is noteworthy that more of the sit less actions were implemented in the small business where a more positive organisational culture (in terms of sitting less at work) was reported by participants. Sitting as a social practice was still apparent in the small business, but having management support helped to offset some of the social norms. Shifting social practice could also require changes to the environment, as well as policy and cultural changes, which could be both costly and complex. This has been demonstrated by the major infrastructure and policy changes that have transformed cycling as a common form of transport in European cities [231].

It is important to gain a deeper understanding of employees' experiences of the social functions of sitting in the workplace as part of intervention development process [232] and using social practice theory in future research could support this. Furthermore, this understanding would help to inform the real-world implementation of approaches to reduce workplace sitting [160].

6.4.3. Organisational characteristics

The organisations purposefully recruited for this research varied in terms of size and sector. This allowed an exploration of a range of contextual factors, which could impact the development, implementation and evaluation of interventions to reduce workplace sitting time. Participants from the small business highlighted the size of the organisation as an enabler to sitting less at work, as the close relationships that they had developed due to the small numbers of staff (n=8) resulted in a positive culture, where they supported and encouraged each other. Positive social relationships have been identified as an area where most power is available to a small business compared to the relatively weak economic or market power they exert [233].

However, the MD also identified the size of the business as a barrier. He reported that it was difficult to access larger scale initiatives to improve health and wellbeing which, due to economies of scale, larger organisations would be more able to afford and adopt [234]. Furthermore, as discussed in Chapters 4 and 5, participants from the small business developed an intervention that was more innovative than those developed by participants in the larger organisations. This could have been due to: (1) the characteristics of the staff in the small business being predominantly younger males resulting in initiatives that encompassed a level of competitiveness [188, 189]; and (2) the fact that participants from the small business felt less restricted by levels of bureaucracy which could stifle innovation in the larger (and publicly funded) organisations [235].

Larger organisations had a greater number of job roles and teams, which raised some specific barriers when it came to participating in the “Sit Less at Work” interventions. For example, it was reported that the customer services team in the charity and local authority had additional barriers in terms of being physically bound to their desks by their headphones and had less flexibility and autonomy in terms of when they could break from work. Previous studies have looked at sitting less interventions in call-centres/customer service-based organisations and found similar barriers [156, 218]. Implementing an organisation-specific intervention, tailored to the needs of staff could have been challenging due to the range of job roles within larger organisations [220]. This could mean that some teams (possibly those who would benefit the most), were inadvertently excluded from the intervention. Hence, there could be a need for even more tailored interventions, down to team-/job role-level.

The nature of work (being primarily desk-based) was a barrier experienced by employees from all of the participating organisations. As explored in Chapter 3, there were inevitable constraints associated with office-work and being “anchored” to the desk. Employees within the customer services team experienced this even more acutely. Office-based, white collar organisations have primarily been the focus of research studies looking at reducing workplace sitting time [106, 219]. This highlights a lack of representation of employees from other types of organisations (e.g., taxi drivers, heavy good vehicle drivers, retail workers). This is an area where future research should consider exploring further, as the nature of work for these employees could present additional and more complex barriers, such as health and safety regulations and the limited opportunities to alter the “workplace” environment, that need to be taken into account when developing and implementing strategies to sit less at work.

6.4.4. The internal environment

The internal environment was identified as both a barrier and enabler to sitting less at work and supported and hindered the implementation of the “Sit Less at Work” interventions. The theme identified in Phase 1, “the workplace is designed for sitting”, demonstrated how the internal environment can promote sitting and discourage movement at work. Although each participating organisation inevitably had a different internal environment, issues relating to the internal environment were similar. The way many offices are set-up with

desks, standard meeting tables and chairs and lack of break-out spaces, reinforces the social practice of sitting at work. Research has demonstrated that activity permissive workplace environments can promote sitting less and moving more [128]. However, the cost associated with such huge environmental-level changes would be a barrier to uptake for many organisations.

In December 2019, (after completing the outcome evaluation), the charity relocated to its new site which was designed to promote “agile working”, where staff were able to move freely around the office and work in any space they chose (a seated desk, standing desk, more relaxed booths, or from home). In addition, meeting rooms included adjustable height desks to facilitate standing meetings and there was an open plan area for larger meetings/training sessions with benches at the back of the room which allowed staff to stand. After an informal discussion with the named contact from the charity, he felt that this move had resulted in changes to the way many staff worked and that the social norms associated with workplace sitting were being challenged. It would be of interest to replicate the research in the new site to collect empirical evidence on the impacts this could have had on the social practice of sitting at work.

6.4.5. Wider economic and political factors

Economic and political factors were only reported by participants in the local authority, but are important broader contextual factors to consider when developing and implementing interventions to reduce workplace sitting. For the local authority, these factors related to on-going budget cuts, limited funding and external political pressures. These factors presented as barriers to sitting less at work due to the perception that they needed to be visibly working to demonstrate that they were needed, hence making them more “deskbound” to conform to the organisation’s standards of behaviour. Furthermore, it was perceived to be difficult to justify spending money on initiatives to help staff to sit less when there were so many other competing priorities, such as mental health. The implication of the wider economic and political factors was a novel finding and not something that has previously been reported in occupational sedentary behaviour research.

6.4.6. The external environment

Factors relating to the external environment did not form a large part of the empirical findings of this research. However, the current COVID-19 pandemic is challenging orthodox systems and structures, so it felt appropriate to give this issue some consideration. Therefore, the primary researcher informally met with the MD in the small business, the named contact in the charity and a member of the public health team in the local authority to discuss the impacts of COVID-19 on working practices. Some of the key issues relating to sitting whilst working during the pandemic were:

- Working from home
 - For some this resulted in sitting less and moving more whilst working, particularly during the initial UK national “lockdown” (March to June 2020), due to simultaneous childcare commitments or

incorporating household chores into the working day. Due to the size of the office in the small business, the incidental movement when working from home was similar to being in the office.

- For others this resulted in sitting more and moving less due to limited space to move compared to the office, e.g., being required to move much shorter distances when taking comfort breaks or making a drink, and missing out on walking as part of commute to work.
 - There were concerns that breaks might be more difficult to take. This was due to a lack of incidental movement breaks, which would naturally occur when working in the office, when staff were able to move between meetings, or to walk to speak with a colleague. The senior leadership team in the local authority had identified this as an issue and consequently was encouraging all meetings to finish 10-15 minutes earlier than planned to allow a break from the screen prior to the next meeting.
 - This new working practice had resulted in a lack of social interactions, which would make modelling positive sitting less behaviours difficult.
 - There had been an enforced shift in managers' perspectives of their staff working from home in the local authority. Managers (particularly middle managers) have had to learn to trust staff to continue to be productive. This meant that some of the stigma associated with working from home identified as part of this research had diminished as the element of choice to work from home had been removed. There were no concerns trusting staff to be productive in the small business or charity.
 - Working from home has revealed some inequalities. Some staff did not have the space or proper equipment to work from home safely and effectively. Some support had been offered, e.g., staff were able to collect their office chairs/keyboards/monitors if they wanted to. However, this did not help the issue of lack of space. There were some concerns that this could result in increased musculoskeletal problems for these staff.
 - There was a feeling that the changes to working practices as a result of COVID-19 will persist post-pandemic, at least to some degree.
- Working in the office
 - When able to work in the office, staff had been advised to limit movement around the office and remain socially distant from colleagues at all times.
 - Changes were implemented to ensure offices are COVID-secure. This limited social interactions and changed the internal environment. This was particularly noticeable for the charity who had just relocated to a new site and had been promoting their new agile working environment. However, since the pandemic staff have been advised to not work flexibly and to remain at one workspace.
 - Misuse of flexitime
 - This was reported in Phase 1 where staff (in the charity and local authority) would work through lunchbreaks, start work earlier or finish work later to build-up flexitime to then enable an extra day-off to be acquired. This was identified as an on-going issue, particularly when working from home as it was much easier to start work early and finish work late.

6.5. Key implications for research and practice

6.5.1. Implications for intervention design and implementation

The current research found that different organisations experienced different barriers and enablers to sitting less at work, hence a “one-size-fits-all” approach to sitting less at work was unlikely to be effective. This resulted in a bespoke and tailored approach to intervention development. Therefore, conducting formative research as an initial step of the intervention development process to understand these barriers and enablers for the target organisation is recommended. This research identified that the formative research stage should be guided by the ecological model of sedentary behaviour to ensure that multiple levels of influence are considered [160]. However, findings also suggested incorporating social practice theory into the formative research, so that organisational-specific issues relating to sitting as a social practice are explored more deeply. This would ensure consideration is given to the three elements of social practice theory: materials (e.g., desks, workplace facilities, the body itself), competence (e.g., awareness of the situation, knowledge, having the time), and meanings (i.e., the social and symbolic significance of sitting at work and past experiences) [225]. Furthermore, there needs to be an explicit consideration of organisational culture and how this impacts existing workplace sitting practices [160]. This could be achieved by using Schein’s model of organisational culture [222], which identifies three levels of culture: artifacts (visible and feelable structures and processes, observed behaviour); espoused beliefs and values (ideals, goals, values, ideologies); and basic underlying assumptions (unconscious, taken-for-granted beliefs and values). A more detailed understanding of organisation-specific barriers and enablers and, hence, where the focus of an intervention needs to be, would then be achieved.

The current findings highlighted that barriers related to intervention implementation varied by organisation. Rigid protocols which state how and when staff should sit, stand or move should be avoided and instead an intervention that accommodates barriers experienced by different staff within an organisation needs to be developed [160]. Smaller businesses could require more strategic, external support with some intervention elements being more prescriptive, such as the use of computer pop-ups, applications or standard “sit less” messaging. Larger organisations could benefit from: more bespoke interventions for individual teams or departments; and different modes of communications when promoting the intervention initiatives. The use of co-production during the development of interventions enables a tailored and bespoke approach.

Practical suggestions to improve the implementation process and support a shift in both organisational culture and the social practice of sitting include:

- *Adequate time and human resource investment when planning and conducting implementation.*
Implementation of interventions, which require a shift in organisational culture and ingrained social practices to support the roll-out, has been shown by this research to be a challenge. Therefore, the

process needs to be well-planned and supported. This requires both time and human resource investment. A barrier to implementation in this research was only having one implementer in each of the larger organisations. Due to workload pressures, competing priorities and lack of management support, the implementers were unable to fully implement the interventions. Involving more staff members in the implementation process would not only provide further support, but also ensure that the intervention is sustainable in the longer-term, as it would be less affected by staff turnover.

- *Ensuring that there is a formal policy or strategy which explicitly highlights the issue of prolonged sitting at work and the importance of sitting less.* This would support staff to feel able to break the ingrained social norms of sitting at work. In addition, including this policy in the induction processes for new starters would help with the long-term sustainability of the intervention.
- *Gaining more integrated buy-in from senior leaders and managers at all levels in the organisation.* This would help to ensure that the “grass-roots” intervention can be adequately operationalised, although this needs to be carefully balanced so as to not disempower staff involved in the co-production [213].
- *Senior leaders and managers to be role models for the “sit less” initiative and peers to be workplace champions.* This could promote the shift in organisational culture and the social practice of sitting and provide peer/social support.
- *Starting with small incremental changes.* For example, having a “standing/movement break” as a regular agenda item during team meetings [160]. This would encourage shifts in organisational culture and the social practice of sitting, as such changes become embedded “normal practice” within an organisation.

6.5.2. Implications for future research directions

The current research identified sitting at work to be a social practice. Although this had previously been identified in sedentary behaviour research [230], it had not been identified before in occupational sedentary behaviour research. Therefore, future research should consider using social practice theory, alongside the ecological model of sedentary behaviour during the development and implementation of interventions to reduce workplace sitting.

Development and implementation of interventions to reduce workplace sitting time has been shown by the current research to be complex. Therefore, evaluations of such interventions should include a mixed-methods process evaluation, reporting details relating to development and implementation, to support any assessment of intervention effectiveness [76]. Furthermore, process evaluation should include an assessment of intervention acceptability and feasibility [160]. The process evaluation should be reported to provide important information about how to replicate the intervention and what generalisable knowledge can be drawn from the implementation [80, 81]. Encouragingly, there have been a number of recent sit less studies published, which have reported theory-driven intervention development and/or implementation processes [236–239].

Future research should consider how job roles could be redesigned in a way that provides more opportunities for sitting less and moving more at work [52]. Researchers should also take into account organisation characteristics when developing and implementing interventions to reduce workplace sitting (as well as other workplace health initiatives). For example, as this research showed, younger, male staff preferred initiatives that encompassed a degree of competition. These considerations could be accounted for by following a co-production methodology.

Finally, future research could also explore barriers and enablers to sitting less at work in non-office based organisations [160], e.g., taxi/Uber drivers, heavy goods vehicle drivers, retail/factory workers. Such occupations present very different barriers and enablers and, as such, a broader more innovative set of intervention strategies need to be considered. Looking into different occupations will also help to incorporate more diverse population sub-groups, including some vulnerable and underrepresented subgroups [240] and help to address potential inequalities.

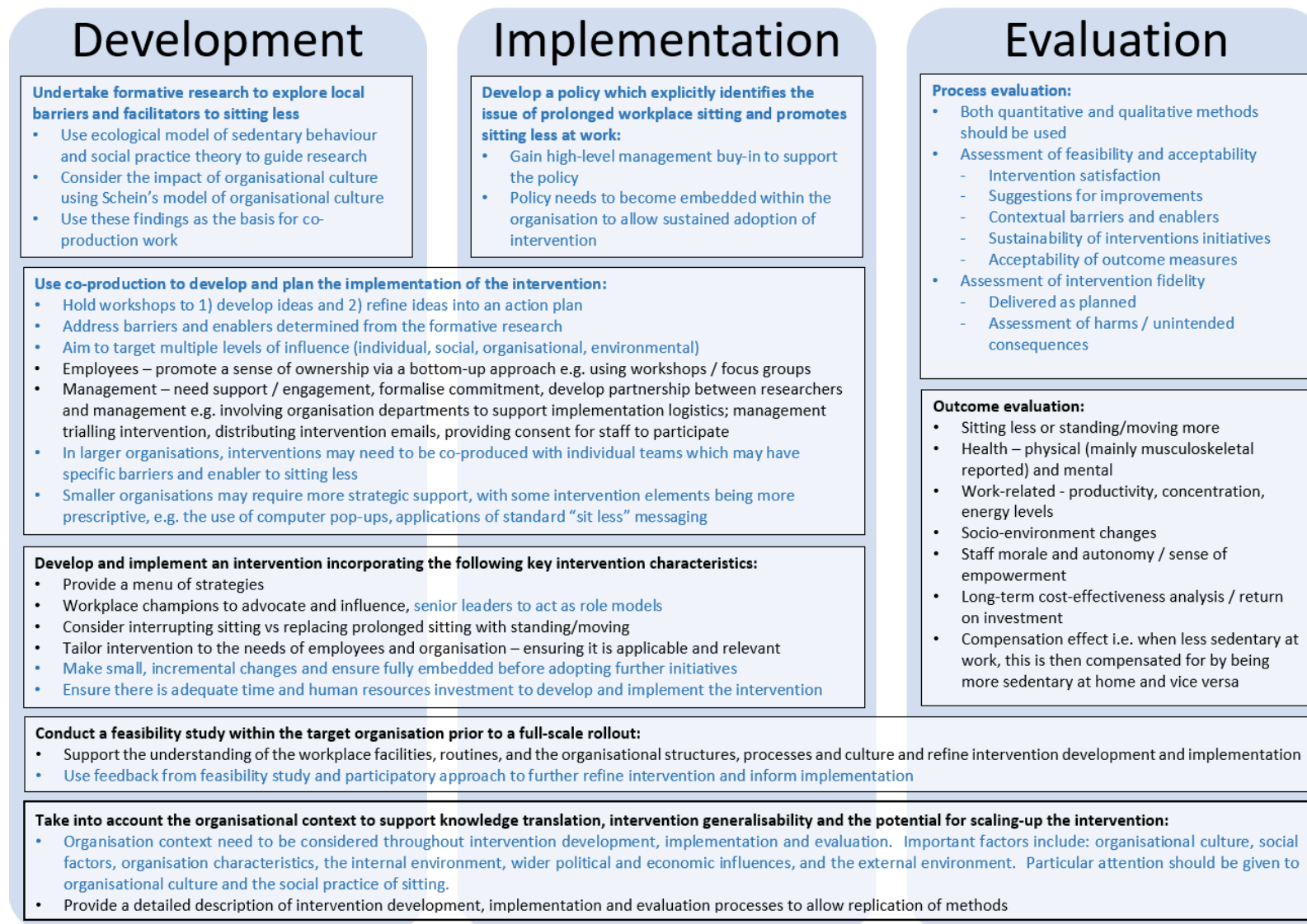
6.6. The refined development, implementation and evaluation operational framework

Based on the findings from the research programme, the operational framework, reported in Chapter 2 (Figure 2.2), was refined (see Figure 6.2). This updated framework is intended for use by both researchers and practitioners to support the future development, implementation and evaluation of interventions to reduce workplace sitting time. The updated version incorporated the following changes:

- The ecological model of sedentary behaviour, social practice theory and Schein’s model of organisational culture have been incorporated into the formative research stage of intervention development (in the original framework this stage was described as “engaging with employees and managers to understand barriers and facilitators to sitting less”). The inclusion of theory at this stage was due to the research findings highlighting the importance of considering multiple levels of influence, and gaining a deeper understanding of the social practice of sitting and organisational culture to determine where changes can be promoted.
- Removal of the step which advised “identifying and using appropriate theoretical models to operationalise intervention strategies” as the theoretical approach has now been incorporated into the formative research stage, which would then be the basis for the co-production stage of the process.
- Including the methods used for co-production as a suggested template for activities (i.e., workshops to both create new ideas and then refine these ideas into a formal intervention). These methods were used in the current research and positively evaluated by participants.

- Including variations in the support organisations of different size could require. This recommendation came from findings that larger organisations experience specific barriers and enablers to sitting less at work and hence may need to co-produce interventions with individual teams rather than at an organisational-level, and smaller organisations could require more strategic external support.
- The “key intervention characteristics” step now includes the following recommendations: senior leaders to be recruited to act as role models; and ensure adequate time and human resources investment for the development and implementation of the intervention. These recommendations were included as practical ways of beginning to shift organisational culture and the social practice of sitting to promote sitting less at work, which this research has identified as key to supporting intervention implementation.
- The step entitled “ensuring the intervention is supported by management and aligns with local policies” has been replaced with “developing a policy which explicitly identifies the issue of prolonged workplace sitting and promotes sitting less at work”. Findings suggested that such a policy could promote sitting less at work by supporting a shift in organisational culture and the social practice of sitting.
- Removal of the step which suggested adopting an iterative and phased approach to implementation and instead, the idea of considering small incremental changes and ensuring they are fully embedded before making additional changes, has been incorporated into the step, “develop and implement and intervention incorporating the following key characteristics”. This recommendation was developed from this research as a means of supporting sustained shifts in organisational culture and the social practice of sitting.
- More detail has been provided for the process evaluation step given how important it was in determining issues with intervention fidelity and the contextual barriers that prevented intervention implementation. This step incorporates the elements of process evaluation that were used in the current research, such as: the use of mixed-methods, an assessment of intervention feasibility and acceptability (including intervention satisfaction, suggestions for improvements, establishing contextual barriers and enablers, sustainability of intervention initiatives, and acceptability of outcome measures), and an assessment of intervention fidelity (including determining if the intervention was delivered as planned and if there were any harms or unintended consequences).
- The step relating to conducting a feasibility study has been extended to incorporate the evaluation phase, as it was clear from this research that evaluation (particularly the process evaluation) was key to understanding some of the challenges to implementation.
- The final step relating to understanding the contextual factors now includes all the contextual factors that this research programme identified as important when considering interventions to reduce workplace sitting time, such as: organisational culture, social factors, organisation characteristics, the internal environment, wider political and economic influences, and the external environment. This step highlights that contextual factors need to be considered during the intervention development, implementation and evaluation, but particular attention should be given to organisational culture and the social practice of sitting.

Figure 6.2: Refined sit less at work intervention development, implementation and evaluation operational framework



NB: blue font denotes the changes that have been made

6.7. Implications of the COVID-19 pandemic on the findings from the research

This PhD research programme was conducted prior to the COVID-19 pandemic. As the pandemic has resulted in widespread changes to our daily lives including working practices, it seems appropriate to include some reflections on the possible implications this could have for the findings of the current research and occupational sedentary behaviour research more generally.

In an effort to continue working whilst limiting the spread of and exposure to the virus, working from home has become the “new normal” for many office workers. As highlighted in Chapter 3, homeworking increased from 27% in 2019 [169] to 47% in April 2020 [170] at the height of the first UK national “lockdown”. Furthermore, it is believed that this change could persist (to some degree) after the COVID-19 crisis has abated [241, 242]. No specific empirical research is yet available on whether working from home has changed workplace sitting time, but as described in Section 6.4.6, anecdotal evidence suggests that for some, sitting time could have reduced, but for others it is likely to have increased. In terms of strategies to support sitting less at work, recommendations from the findings of this research programme could be less applicable when staff are working from home and, hence, need to be adapted. For example, attempting to alter organisational culture by engaging workplace champions and having senior leaders as role models would have less of an impact in the current climate, as staff would not be regularly observing the behaviours of these role models. Instead, champions/leaders could ensure that they are standing or moving at any opportunity where other staff are involved, such as during virtual meetings, or include pictures of themselves taking regular sitting breaks on communications sent to all-staff. There could also be more proactive strategies, such as developing policies to ensure staff take regular breaks when working from home or not scheduling meetings during lunchtimes to allow staff time to go for a walk or take a break from their screen.

In addition, as described in Section 6.4.6, working from home could highlight some health inequalities. Not all staff who are required to work from home will have the space or equipment that they need to achieve this comfortably, resulting in ergonomic concerns. This could mean that some staff would be more exposed to health consequences of a sedentary job, such as musculoskeletal problems [243].

As a result of the COVID-19 pandemic, economic and political pressures could be felt more widely and become more prominent [244] (unlike the findings from this research where this contextual factor was identified only by staff in the local authority). This could be as a result of implications of national lockdowns and other COVID-secure/social distancing measures many workplaces are now subject to [245], but also could be linked to issues around job insecurity and further long-term economic concerns [246]. Reducing sitting is already a low priority for both staff and managers, with multiple competing goals [247]. In the current climate, there could be other more pressing issues that organisations need to deal with (such as funding cuts and viability of business). Therefore, developing a policy on the importance of sitting less at work, for example, would be even less of a priority. However, given the importance of ensuring employee mental and physical wellbeing

and the propensity for many staff to be “glued” to their screens [242], it could actually be an ideal time to address issues of prolonged workplace sitting.

Conducting the research in the current climate would likely result in the emergence of additional barriers to sitting less “at work” and the requirement for more innovative strategies, but could also present some opportunities. Given the likelihood that at least some of the enforced changes will continue post-COVID-19, it would be of interest to conduct some initial formative research to begin to understand how this “new normal” will impact occupational sedentary behaviour research.

6.8. Strengths and limitations

6.8.1. Strengths

The research presented in this thesis had a number of strengths. First, this was a pragmatic, real-world programme of research, specifically planned to enhance the external validity of the findings [79]. As a result, there was minimal researcher involvement in the implementation of the interventions (primary researcher provided template communications only). This limited involvement was crucial in highlighting the barriers when implementing interventions to reduce workplace sitting (particularly those barriers relating to organisational culture and sitting as a social practice). Furthermore, conducting a detailed mixed-methods process evaluation ensured that the issues relating to the lack of intervention fidelity were identified which, in turn, helped to explain the findings from the outcome evaluation [84, 191].

Second, the co-production of the interventions ensured initiatives were tailored to the needs of staff in the target organisation [86]. Findings from the integrative review reported in Chapter 2 identified the use of participatory approaches as a key step in the intervention development and implementation process [106] and is consistent with the MRC guidance on development of complex interventions [84]. In addition, participatory approaches support the production of knowledge that is more relevant and translatable in the real-world [181]. The workshops held as part of the co-production process were positively evaluated by participants. The creative thinking techniques received particularly positive feedback, as these were innovative and modelled the idea of sitting less at work, with the majority of the activities being done whilst standing or moving.

Third, the use of theory, in the form of the ecological model of sedentary behaviour [161], was a strength of this research. The integrative review reported in Chapter 2 identified the importance of using theory during the development and implementation of such interventions [106]. Further, ecological models were highlighted as useful for addressing contextual factors which could be important for specific settings, such as the workplace, since behaviours associated with a setting (i.e., sitting at work) have distinct determinants [161]. Ecological approaches have been used by other researchers when developing interventions to reduce

workplace sitting [62, 64, 87, 133]. In addition, the use of the ecological model of sedentary behaviour allowed an assessment of organisational and social factors associated with workplace sitting and the barriers and enablers that these factors resulted in. This then provided the basis of the theoretical contribution of this research by suggesting consideration be given to Schein's model of organisational culture and the social practice theory.

Fourth, the inclusion of organisations of different size and sector ensured a range of development and implementation barriers and enablers were explored. This allowed the barriers and enablers to be compared and contrasted across the organisations identifying where commonalities and differences were which, in turn, highlighted the importance of contextual factors in the development, implementation and evaluation of interventions to reduce workplace sitting.

Fifth, this research resulted in the development and subsequent refinement of an evidence-based operational framework to support the development, implementation and evaluation of interventions to reduce workplace sitting. Although the initial version of the framework was not fit for purpose, as the interventions were not implemented as intended, it did enable the identification of where the challenges in the process appeared and hence, where further consideration was required. Findings from the testing of this framework as part of this research have been incorporated into a refined version which requires further testing. After further testing, this framework has the potential to support future research and practice into sitting reduction strategies, ensuring adequate consideration is given to contextual factors to support the real-world translation of the findings.

Finally, the use of public involvement throughout the research process (including development of the original research plan) was invaluable in ensuring that the: methods used in this research were acceptable; information provided to participants was clear and easy to understand; findings were relevant and useful; and research was grounded in the real-world [248].

6.8.2. Limitations

The research presented in this thesis should also be considered in the context of several limitations. First, convenience samples of participants were used throughout this research. This is likely to have resulted in selection bias, whereby individuals already interested in the issues of sitting less and moving more at work self-selected to participate in the research. This is a common issue in physical activity-related research [191]. This was also likely to have been an issue during the co-production process. This meant that data collected and ideas suggested were unlikely to be representative of staff in each organisation and hence, additional barriers and enablers to sitting less at work and the implementation of interventions could have been missed. Attempts were made during recruitment to encourage all staff to participate, but future research could consider the use of incentives to encourage a more representative sample [191].

Second, although involving staff, who were effectively the “end users” of the intervention, in the co-production process was a strength of this research, there were some limitations to this process. For instance, the co-production process was resource intensive in terms of time commitments required from the primary researcher and the volunteers. Although the primary researcher had limited involvement in the implementation of the interventions to support the external validity of the findings, this was not the case for the development process. The volunteers participated in this process during their work time, so there was an associated opportunity cost to their involvement, although they were given permission from senior management to participate. Nevertheless, the co-production method used in the research was intended to be a template for future research and practice if it was deemed to be feasible, where a member of staff could act as the facilitator instead of the researcher. In addition, there were issues with some of the initiatives suggested by staff not being deemed feasible by senior managers and hence not being implemented. This was particularly the case in the local authority. Larger public sector organisations, have additional layers of bureaucracy [249] and such initiatives need to be approved at different levels in order to support the implementation. This issue further supports the idea presented in the refined operational framework that there needs to be integrated management buy-in throughout the development and implementation process.

Third, there was minimal senior management buy-in in the larger organisations. Despite gaining buy-in from senior leaders at the initial stage of the research programme, who granted permission for the project to be conducted within the participating organisations, in the larger organisations this is where the involvement ended. This impacted effective implementation of the interventions, but also did not enable shifts in organisational culture and the social norms of sitting, which this research programme has identified as essential to making sustained changes to workplace sitting time. Future research and practice need to make management engagement in the project a key focus of the intervention [160].

Fourth, no formal cost-effectiveness evaluation was conducted, despite this being recommended in the operational framework. The reason for this was due to the lack of intervention fidelity and efficacy, which meant that determining the cost-effectiveness of the interventions was not appropriate. The interventions developed were intended to be “low-cost”, as determined by the participating organisations (i.e., there was no requirement for the participating organisations to purchase additional equipment). However, opportunity costs, such as time and human resources (of participants and the primary researcher), were not considered as part of the costs of the intervention. As these costs are much less tangible, conducting a cost-effectiveness analysis would be more complex. However, this should be a consideration for future research.

Finally, the large corporation dropped out of the project at the implementation stage. It was not possible to collect any formal data on the reasons for drop-out, but anecdotal information provided suggested the main barrier to implementation was lack of time and workload pressures amongst the staff who volunteered to develop the intervention. In addition, there was limited staff engagement (only two members of staff were involved in the intervention development process) and lack of management support. This highlights that

sitting less at work is not seen as a priority by some organisations and their staff, so some initial awareness raising, early recruitment of workplace champions, and senior management buy-in would be required in such organisations prior to attempting to develop an intervention to reduce workplace sitting.

6.9. Overall contribution of this research and final conclusions

Findings from this pragmatic research programme have generated a number of novel contributions to the occupational sedentary behaviour research field.

6.9.1. Empirical contributions

The key empirical contributions relate to findings from the integrative systematic review and Phases 1 and 3. The integrative review determined that different and innovative ways to embed interventions to reduce workplace sitting time into different organisational contexts was needed to begin addressing the public health issues associated with prolonged sitting at work. Previous intervention studies utilising sit-stand desks (either alone or as part of a multicomponent intervention) demonstrated short-term reductions in workplace sitting time. However, in general, longer-term sustainable changes have not been achieved. Furthermore, there are limitations to the use of sit-stand desks due to the associated costs, which could present as a barrier to uptake for many organisations. Therefore, the testing of low-cost interventions not requiring the purchasing of additional equipment was needed. The qualitative part of the systematic review highlighted a number of key considerations that were found to be important for the development, implementation and evaluation of interventions to reduce workplace sitting time. These findings were then translated into a novel operational framework, the testing of which made up the remainder of the research programme.

Phase 1 then determined the barriers and enablers to workplace sitting in four organisations that differed in terms of size and sector. The findings were broadly in line with previous research, but also identified key differences between the organisations, which mainly related to organisational culture, organisation size, ways of working, the idea of presenteeism and wider political and economic influences. Public and voluntary sector organisations faced more constraints and bureaucracy due to higher levels of scrutiny and accountability compared to private sector organisations, which had more freedom to innovate and make changes. The findings highlighted the importance of developing an understanding of relevant organisational and wider contextual factors when developing sit less at work interventions.

Phase 3 found that none of the co-produced “Sit Less at Work” interventions resulted in a consistent reduction in workplace sitting time. However, the process evaluation highlighted the challenges of implementing such interventions, as none were implemented as intended. Barriers to implementation particularly related to organisational culture and the social norms of sitting. The latter seemed to suggest that sitting was more than

a behaviour, but actually a social practice and that further understanding of the social barriers to sitting less at work is needed. Furthermore, in the larger organisations, the lack of management support during implementation and only having one implementer were found to be additional barriers.

6.9.2. Methodological contributions

Findings from the current research have highlighted the benefits of pragmatic research which promotes external validity. The key output from the integrative review was the development of the operational framework, which was then tested in several organisations that ranged in terms of size and sector to guide the development, implementation and evaluation of interventions to reduce workplace sitting. Based on the findings from this research, the operational framework was subsequently refined as presented earlier in this chapter. This refined version needs to be tested in future research and practice concerned with reducing workplace sitting time.

The use of co-production methods when developing such interventions was a key step in the operational framework. Phase 2 demonstrated the use of co-production during the development of four “Sit Less at Work” interventions. Co-production methods used in this research included creative thinking activities to generate initial ideas and then incorporated those ideas into a practical intervention. Improvements to the co-production process involve gaining management support whilst developing the interventions and more comprehensive planning for the implementation phase. This would ensure that the interventions developed were feasible and acceptable throughout all levels of the organisation. This was a particular issue for the larger organisations which had greater levels of bureaucracy.

Conducting a detailed process evaluation was also identified as a key step of the operational framework. Process evaluation helps to explain how and why interventions may or may not work and can provide important information to policymakers and practitioners about: how to replicate the intervention; how the intervention could be improved to maximise effectiveness; and what generalisable knowledge can be drawn from the implementation. In addition, the process evaluation should be reported in full to facilitate this knowledge translation.

6.9.3. Theoretical contributions

The research has emphasised the benefits of using ecological approaches when developing and implementing interventions to reduce workplace sitting time, which ensure multiple levels of influence are targeted and a broad range of contextual factors are considered. Organisational culture was found to be a key contextual factor, suggesting that using Schein’s model of organisational culture could be helpful when seeking to reduce workplace sitting time. Furthermore, this research has provided a deeper understanding that sitting at work is more than an individual behaviour, but in fact an ingrained social practice. To explore this in more detail, drawing on the social practice theory during intervention development and implementation is recommended.

6.9.4. Final conclusions

Overall, the findings suggest the successful development, implementation and evaluation of interventions to reduce workplace sitting time requires the careful consideration of a range of contextual factors that influence the modern workplace. Key contextual factors identified were: organisational culture, social factors, organisation characteristics, the internal environment and wider economic and political influences. In addition, issues relating to the external environment have been highlighted through the impact of the COVID-19 pandemic on the work environment. The use of the ecological model of sedentary behaviour along with Schein's model of organisational culture and the social practice theory would ensure future research addresses relevant contextual factors, whilst giving particular consideration to ways of shifting organisational culture and the social practice of sitting at work. In practical terms, such a shift could be achieved by: ensuring adequate time and human resource investment is given to planning and conducting intervention implementation; gaining integrated buy-in from senior leaders and managers at all levels in the organisation; developing and embedding a policy which explicitly highlights the importance of sitting less at work; recruiting senior leaders to act as role models and staff volunteers to be workplace champions; and starting with small incremental changes. Additional actions would be required, tailored to the needs of the target organisation, which could be developed and implemented through co-production. The refined operational framework supporting the development, implementation and evaluation of interventions to reduce workplace sitting time can be used to ensure future interventions consider these factors in order to develop and deliver more effective interventions.

References

1. Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, et al. Sedentary Behavior Research Network (SBRN) – Terminology Consensus Project process and outcome. *Int J Behav Nutr Phys Act*. 2017;14:75. doi:10.1186/s12966-017-0525-8.
2. Dunstan DW, Kingwell BA, Larsen R, Healy GN, Cerin E, Hamilton MT, et al. Breaking up prolonged sitting reduces postprandial glucose and insulin responses. *Diabetes Care*. 2012;35:976–83. doi:10.2337/dc11-1931.
3. Hamilton MT, Hamilton DG, Zderic TW. Exercise physiology versus inactivity physiology: an essential concept for understanding lipoprotein lipase regulation. *Exerc Sport Sci Rev*. 2004;32:161–6.
4. Department of Health and Social Care. UK Chief Medical Officers' physical activity guidelines. London; 2019. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832868/uk-chief-medical-officers-physical-activity-guidelines.pdf. Accessed 27 May 2020.
5. Stamatakis E, Ekelund U, Ding D, Hamer M, Bauman AE, Lee IM. Is the time right for quantitative public health guidelines on sitting? A narrative review of sedentary behaviour research paradigms and findings. *Br J Sports Med*. 2019;53:377–82.
6. Ross R, Chaput JP, Giangregorio LM, Janssen I, Saunders TJ, Kho ME, et al. Canadian 24-hour movement guidelines for adults aged 18-64 years and adults aged 65 years or older: an integration of physical activity, sedentary behaviour, and sleep. *Appl Physiol Nutr Metab*. 2020;45:S57–102.
7. Martin A, Fitzsimons C, Jepson R, Saunders DH, van der Ploeg HP, Teixeira PJ, et al. Interventions with potential to reduce sedentary time in adults: systematic review and meta-analysis. *Br J Sports Med*. 2015;49:1056–63.
8. Morris JN, Heady JA, Raffle PAB, Roberts CG, Parks JW. Coronary heart disease and physical activity of work. *Lancet*. 1953;262:1111–20.
9. Warburton DER, Nicol CW, Bredin SSD. Health benefits of physical activity: the evidence. *CMAJ*. 2006;174:801–9.
10. Rhodes RE, Mark RS, Temmel CP. Adult sedentary behavior: a systematic review. *Am J Prev Med*. 2012;42:e3-28. doi:10.1016/j.amepre.2011.10.020.
11. de Rezende LFM, Rodrigues Lopes M, Rey-López JP, Matsudo VKR, Luiz O do C. Sedentary behavior and health outcomes: an overview of systematic reviews. *PLoS One*. 2014;9:e105620.
12. Biswas A, Oh PI, Faulkner GE, Bajaj RR, Silver MA, Mitchell MS, et al. Sedentary time and its association with risk for disease incidence, mortality, and hospitalization in adults. *Ann Intern Med*. 2015;162:123.
13. Dunstan DW, Howard B, Healy GN, Owen N. Too much sitting: a health hazard. *Diabetes Res Clin Pract*. 2012;97:368–76. doi:10.1016/j.diabres.2012.05.020.
14. Ford ES, Caspersen CJ. Sedentary behaviour and cardiovascular disease: a review of prospective studies. *Int J Epidemiol*. 2012;41:1338–53. doi:10.1093/ije/dys078.
15. Grøntved A, Hu FB. Television viewing and risk of type 2 diabetes, cardiovascular disease, and all-cause mortality: a meta-analysis. *JAMA*. 2011;305:2448–55. doi:10.1001/jama.2011.812.
16. Alavi S, Makarem J, Mehrdad R, Abbasi M. Metabolic syndrome: a common problem among office workers. *Int J Occup Env Med*. 2015;6:492–534.
17. Edwardson CL, Gorely T, Davies MJ, Gray LJ, Khunti K, Wilmot EG, et al. Association of sedentary behaviour with metabolic syndrome: a meta-analysis. *PLoS One*. 2012;7:e34916. doi:10.1371/journal.pone.0034916.

18. Proper KI, Singh AS, van Mechelen W, Chinapaw MJM. Sedentary behaviors and health outcomes among adults: a systematic review of prospective studies. *Am J Prev Med.* 2011;40:174–82. doi:10.1016/j.amepre.2010.10.015.
19. van Uffelen JGZ, Wong J, Chau JY, van der Ploeg HP, Riphagen I, Gilson ND, et al. Occupational sitting and health risks: a systematic review. *Am J Prev Med.* 2010;39:379–88.
20. Patterson R, McNamara E, Tainio M, de Sá TH, Smith AD, Sharp SJ, et al. Sedentary behaviour and risk of all-cause, cardiovascular and cancer mortality, and incident type 2 diabetes: a systematic review and dose response meta-analysis. *Eur J Epidemiol.* 2018;33:811–29.
21. Lee PH, Wong FKY. The association between time spent in sedentary behaviors and blood pressure: a systematic review and meta-analysis. *Sports Med.* 2015;45:867–80. doi:10.1007/s40279-015-0322-y.
22. Lynch BM. Sedentary behavior and cancer: a systematic review of the literature and proposed biological mechanisms. *Cancer Epidemiol Biomarkers Prev.* 2010;19:2691–709. doi:10.1158/1055-9965.EPI-10-0815.
23. Cong YJ, Gan Y, Sun HL, Deng J, Cao SY, Xu X, et al. Association of sedentary behaviour with colon and rectal cancer: a meta-analysis of observational studies. *Br J Cancer.* 2014;110:817–26.
24. Teychenne M, Ball K, Salmon J. Sedentary behavior and depression among adults: a review. *Int J Behav Med.* 2010;17:246–54. doi:10.1007/s12529-010-9075-z.
25. Teychenne M, Costigan SA, Parker K. The association between sedentary behaviour and risk of anxiety: a systematic review. *BMC Public Health.* 2015;15:513.
26. Okely JA, Čukić I, Shaw RJ, Chastin SF, Dall PM, Deary IJ, et al. Positive and negative well-being and objectively measured sedentary behaviour in older adults: evidence from three cohorts. *BMC Geriatr.* 2019;19:28.
27. Zhai L, Zhang Y, Zhang D. Sedentary behaviour and the risk of depression: a meta-analysis. *Br J Sports Med.* 2015;49:705–9.
28. Stamatakis E, Gale J, Bauman A, Ekelund U, Hamer M, Ding D. Sitting time, physical activity, and risk of mortality in adults. *J Am Coll Cardiol.* 2019;73:2062–72.
29. Chau JY, Grunseit AC, Chey T, Stamatakis E, Brown WJ, Matthews CE, et al. Daily sitting time and all-cause mortality: a meta-analysis. *PLoS One.* 2013;8:e8000.
30. Katzmarzyk PT, Church TS, Craig CL, Bouchard C. Sitting time and mortality from all causes, cardiovascular disease, and cancer. *Med Sci Sports Exerc.* 2009;41:998–1005.
31. Biddle SJH, Bennie JA, Bauman AE, Chau JY, Dunstan D, Owen N, et al. Too much sitting and all-cause mortality: is there a causal link? *BMC Public Health.* 2016;16:635.
32. Saunders TJ, Atkinson HF, Burr J, MacEwen B, Skeaff CM, Peddie MC. The acute metabolic and vascular impact of interrupting prolonged sitting: a systematic review and meta-analysis. *Sport Med.* 2018;48:2347–66.
33. Waongenngarm P, Areerak K, Janwantanakul P. The effects of breaks on low back pain, discomfort, and work productivity in office workers: A systematic review of randomized and non-randomized controlled trials. *Appl Ergon.* 2018;68:230–9.
34. Heron L, O’Neill C, McAneney H, Kee F, Tully MA. Direct healthcare costs of sedentary behaviour in the UK. *J Epidemiol Community Heal.* 2019;73:625–9.
35. Owen N, Healy GN, Matthews CE, Dunstan DW. Too much sitting: the population health science of sedentary behavior. *Exerc Sport Sci Rev.* 2010;38:105–13. doi:10.1097/JES.0b013e3181e373a2.

36. MacAuley D. A history of physical activity, health and medicine. *J R Soc Med.* 1994;87:32–5.
37. Penedo FJ, Dahn JR. Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Curr Opin Psychiatry.* 2005;18:189–93.
38. Warburton DER, Nicol CW, Bredin SSD. Health benefits of physical activity: the evidence. *CMAJ.* 2006;174:801–9.
39. Dunstan DW, Healy GN, Sugiyama T, Owen N. ‘Too much sitting’ and metabolic risk – has modern technology caught up with us? *Eur Endocrinol.* 2009;5:29–33.
40. Owen N, Bauman A, Brown W. Too much sitting: a novel and important predictor of chronic disease risk? *Br J Sports Med.* 2009;43:81–3. doi:10.1136/bjsm.2008.055269.
41. Department of Health. Start Active, Stay Active: A report on physical activity for health from the four home countries’ Chief Medical Officers. London, UK; 2011.
42. NatCen Social Research. Health Survey for England - 2012. London; 2013. <https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/health-survey-for-england-2012>. Accessed 27 May 2020.
43. Chastin SFM, Dontje ML, Skelton DA, Čukić I, Shaw RJ, Gill JMR, et al. Systematic comparative validation of self-report measures of sedentary time against an objective measure of postural sitting (activPAL). *Int J Behav Nutr Phys Act.* 2018;15:21.
44. Hamilton MT, Healy GN, Dunstan DW, Zderic TW, Owen N. Too little exercise and too much sitting: inactivity physiology and the need for new recommendations on sedentary behavior. *Curr Cardiovasc Risk Rep.* 2008;2:292–8. doi:10.1007/s12170-008-0054-8.
45. Thorp AA, Owen N, Neuhaus M, Dunstan DW. Sedentary behaviors and subsequent health outcomes in adults a systematic review of longitudinal studies, 1996–2011. *Am J Prev Med.* 2011;41:207–15. doi:10.1016/j.amepre.2011.05.004.
46. Ekelund U, Steene-Johannessen J, Brown WJ, Fagerland MW, Owen N, Powell KE, et al. Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women. *Lancet.* 2016;388:1302–10.
47. Ekelund U, Brown WJ, Steene-Johannessen J, Fagerland MW, Owen N, Powell KE, et al. Do the associations of sedentary behaviour with cardiovascular disease mortality and cancer mortality differ by physical activity level? A systematic review and harmonised meta-analysis of data from 850 060 participants. *Br J Sports Med.* 2019;53:886–94.
48. Sport England. Active lives adult survey November 2018/19 report. London; 2020.
49. Hagstromer M, Ainsworth BE, Oja P, Sjostrom M. Comparison of a subjective and an objective measure of physical activity in a population sample. *J Phys Act Heal.* 2010;7:541–50.
50. van der Ploeg HP, Hillsdon M. Is sedentary behaviour just physical inactivity by another name? *Int J Behav Nutr Phys Act.* 2017;14:1–8.
51. Mansoubi M, Pearson N, Biddle SJH, Clemes S. The relationship between sedentary behaviour and physical activity in adults: A systematic review. *Prev Med (Baltim).* 2014;69:28–35.
52. Straker L, Mathiassen SE. Increased physical work loads in modern work--a necessity for better health and performance?. *Ergonomics.* 2009;52:1215–25.
53. Church TS, Thomas DM, Tudor-Locke C, Katzmarzyk PT, Earnest CP, Rodarte RQ, et al. Trends over 5 decades in U.S. occupation-related physical activity and their associations with obesity. *PLoS One.*

2011;6:e19657. doi:10.1371/journal.pone.0019657.

54. Dugdill L, Crone D, Murphy R. Physical activity and health promotion: evidence-based approaches to practice. John Wiley & Sons; 2009.
55. Batt ME. Physical activity interventions in the workplace: the rationale and future direction for workplace wellness. *Br J Sports Med.* 2008;43:47–8. doi:10.1136/bjsm.2008.053488.
56. Clemes SA, Patel R, Mahon C, Griffiths PL, A T, A B. Sitting time and step counts in office workers. *Occup Med (Chic Ill).* 2014;64:188–92. doi:10.1093/occmed/kqt164.
57. Healy G, Lawler S, Thorp A, Neuhaus M, Robson E, Owen N, et al. Reducing prolonged sitting in the workplace (An evidence review: full report). Melbourne, Australia; 2012.
58. Ben-Ner A, Hamann DJ, Koepp G, Manohar CU, Levine J. Treadmill workstations: the effects of walking while working on physical activity and work performance. *PLoS One.* 2014;9:e88620. doi:10.1371/journal.pone.0088620.
59. Chau JY, Daley M, Dunn S, Srinivasan A, Do A, Bauman AE, et al. The effectiveness of sit-stand workstations for changing office workers' sitting time: results from the Stand@Work randomized controlled trial pilot. *Int J Behav Nutr Phys Act.* 2014;11:127.
60. Carr LJ, Walaska KA, Marcus BH. Feasibility of a portable pedal exercise machine for reducing sedentary time in the workplace. *Br J Sports Med.* 2012;46:430–5. doi:10.1136/bjsm.2010.079574.
61. Neuhaus M, Healy G, Dunstan D. Workplace sitting and height-adjustable workstations: a randomized controlled trial. *Am J Prev Med.* 2014;46:30–40.
62. Healy GN, Eakin EG, Lamontagne AD, Owen N, Winkler EAH, Wiesner G, et al. Reducing sitting time in office workers: short-term efficacy of a multicomponent intervention. *Prev Med (Baltim).* 2013;57:43–8. doi:10.1016/j.ypmed.2013.04.004.
63. Lang JJ, McNeil J, Tremblay MS, Saunders TJ. Sit less, stand more: a randomized point-of-decision prompt intervention to reduce sedentary time. *Prev Med (Baltim).* 2015;73:67–9. doi:10.1016/j.ypmed.2015.01.026.
64. Mackenzie K, Goyder E, Eves F. Acceptability and feasibility of a low-cost, theory-based and co-produced intervention to reduce workplace sitting time in desk-based university employees. *BMC Public Health.* 2015;15:1294.
65. Gao Y, Nevala N, Cronin NJ, Finni T. Effects of environmental intervention on sedentary time, musculoskeletal comfort and work ability in office workers. *Eur J Sport Sci.* 2016;16:747–54.
66. Grunseit AC, Chau JY-Y, van der Ploeg HP, Bauman A. "Thinking on your feet": a qualitative evaluation of sit-stand desks in an Australian workplace. *BMC Public Health.* 2013;13:365.
67. Mansoubi M, Pearson N, Biddle SJH, Clemes SA. Using sit-to-stand workstations in offices: is there a compensation effect? *Med Sci Sports Exerc.* 2016;48:720–5. doi:10.1249/MSS.0000000000000802.
68. Gordon A. A theory-based pilot study to decrease sitting time in the workplace - Dissertation Thesis. Arizona State University, Arizona; 2013.
69. Chau JY, van der Ploeg HP, Dunn S, Kurko J, Bauman AE. A tool for measuring workers' sitting time by domain: the Workforce Sitting Questionnaire. *Br J Sports Med.* 2011;45:1216–22. doi:10.1136/bjsports-2011-090214.
70. Kozey-Keadle S, Libertine A, Lyden K, Staudenmayer J, Freedson P. Validation of wearable monitors for assessing sedentary behavior. *Med Sci Sports Exerc.* 2011;43:1561–7.

71. Chau JY, van der Ploeg HP, van Uffelen JGZ, Wong J, Riphagen I, Healy GN, et al. Are workplace interventions to reduce sitting effective? A systematic review. *Prev Med (Baltim)*. 2010;51:352–6. doi:10.1016/j.ypmed.2010.08.012.
72. Neuhaus M, Eakin EG, Straker L, Owen N, Dunstan DW, Reid N, et al. Reducing occupational sedentary time: a systematic review and meta-analysis of evidence on activity-permissive workstations. *Obes Rev*. 2014;15:822–38. doi:10.1111/obr.12201.
73. Tew GA, Posso MC, Arundel CE, McDaid CM. Systematic review: height-adjustable workstations to reduce sedentary behaviour in office-based workers. *Occup Med (Lond)*. 2015;65:357–366.
74. Chu AHY, Ng SHX, Tan CS, Win AM, Koh D, Müller-Riemenschneider F. A systematic review and meta-analysis of workplace intervention strategies to reduce sedentary time in white-collar workers. *Obes Rev*. 2016;17:467–81. doi:10.1111/obr.12388.
75. Commissaris DA, Huysmans MA, Mathiassen SE, Srinivasan D, Koppes LL, Hendriksen IJ. Interventions to reduce sedentary behavior and increase physical activity during productive work: a systematic review. *Scand J Work Environ Health*. 2016;42:181–91.
76. Hutcheson AK, Piazza AJ, Knowlden AP. Work site-based environmental interventions to reduce sedentary behavior: a systematic review. *Am J Health Promot*. 2016;32:1–16. doi:https://doi.org/10.1177/0890117116674681.
77. Shrestha N, Kukkonen-Harjula KT, Verbeek JH, Ijaz S, Hermans V, Pedisic Z. Workplace interventions for reducing sitting at work. *Cochrane Database Syst Rev*. 2018.
78. Shrestha N, Ijaz S, Kukkonen-Harjula KT, Kumar S, Nwankwo CP. Workplace interventions for reducing sitting at work. *Cochrane database Syst Rev*. 2015;1:CD010912. doi:10.1002/14651858.CD010912.pub2.
79. Woolcock M. Using case studies to explore the external validity of ‘complex’ development interventions. *Evaluation*. 2013;19:229–48.
80. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, et al. Process evaluation of complex interventions: Medical Research Council guidance. *Br Med J*. 2015;350:h1258.
81. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, et al. Process evaluation of complex interventions: Medical Research Council guidance (full guidance). London, UK; 2014.
82. Stetler CB, Legro MW, Wallace CM, Bowman C, Guihan M, Hagedorn H, et al. The role of formative evaluation in implementation research and the QUERI experience. *J Gen Intern Med*. 2006;21:1–8.
83. Mansfield L, Hall J, Smith L, Rasch M, Reeves E, Dewitt S, et al. “Could you sit down please?” A qualitative analysis of employees’ experiences of standing in normally-seated workplace meetings. *PLoS One*. 2018;13:e0198483.
84. Craig P. Developing and evaluating complex interventions: new guidance. London, UK: Medical Research Council; 2006.
85. Gilson ND, Ng N, Pavey TG, Ryde GC, Straker L, Brown WJ. Project Energise: Using participatory approaches and real time computer prompts to reduce occupational sitting and increase work time physical activity in office workers. *J Sci Med Sport*. 2016;19:926–30.
86. Parry S, Straker L, Gilson ND, Smith AJ. Participatory workplace interventions can reduce sedentary time for office workers: a randomised controlled trial. *PLoS One*. 2013;8:e78957. doi:10.1371/journal.pone.0078957.
87. Neuhaus M, Healy GN, Fjeldsoe BS, Lawler S, Owen N, Dunstan DW, et al. Iterative development of Stand Up Australia: a multi-component intervention to reduce workplace sitting. *Int J Behav Nutr Phys Act*. 2014;11:21. doi:10.1186/1479-5868-11-21.

88. Alkhajah TA, Reeves MM, Eakin EG, Winkler EAH, Owen N, Healy GN. Sit-stand workstations: a pilot intervention to reduce office sitting time. *Am J Prev Med.* 2012;43:298–303. doi:10.1016/j.amepre.2012.05.027.
89. Dutta N, Koeppe G, Stovitz S, Levine J, Pereira M. Using sit-stand workstations to decrease sedentary time in office workers: a randomized crossover trial. *Int J Environ Res Public Health.* 2014;11:6653–65. doi:10.3390/ijerph110706653.
90. De Cocker K, De Bourdeaudhuij I, Cardon G, Vandelanotte C. The effectiveness of a web-based computer-tailored intervention on workplace sitting: a randomized controlled trial. *J Med Internet Res.* 2016;18:e96.
91. Tobin R, Leavy J, Jancey J. Uprising: An examination of sit-stand workstations, mental health and work ability in sedentary office workers, in Western Australia. *Work.* 2016;55:359–71.
92. Danquah IH, Kloster S, Holtermann A, Aadahl M, Bauman A, Ersboll AK, et al. Take a Stand!-a multi-component intervention aimed at reducing sitting time among office workers - a cluster randomized trial. *Int J Epidemiol.* 2016;46:128–40.
93. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ.* 2008;337:a1655.
94. Skivington K, Matthews L, Craig P, Simpson S, Moore L. Developing and evaluating complex interventions: updating Medical Research Council guidance to take account of new methodological and theoretical approaches. *Lancet.* 2018;392:S2.
95. Keith RE, Crosson JC, O'Malley AS, Crompton DA, Taylor EF. Using the Consolidated Framework for Implementation Research (CFIR) to produce actionable findings: A rapid-cycle evaluation approach to improving implementation. *Implement Sci.* 2017;12:1–12.
96. Crotty M. *The foundations of social research: Meaning and perspective in the research process.* London, UK: SAGE Publications Inc.; 1998.
97. Betzner AE, Lawrenz F. *Pragmatic and dialectic mixed method approaches: an empirical comparison.* PhD thesis. University of Minnesota; 2008.
98. Frey BB. Pragmatic paradigm. In: *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation.* SAGE Publications, Inc.; 2018.
99. Dewey J. The development of American pragmatism. In: Thayer HS, editor. *Pragmatism: The classic writings.* Indianapolis, Indiana: Hackett; 1931. p. 22–40.
100. Kaushik V, Walsh CA. Pragmatism as a research paradigm and its implications for social work research. *Soc Sci.* 2019;8:255.
101. Goldkuhl G. Pragmatism vs interpretivism in qualitative information systems research. *Eur J Inf Syst.* 2012;21:135–46.
102. Kelly LM, Cordeiro M. Three principles of pragmatism for research on organizational processes. *Methodol Innov.* 2020;13:205979912093724.
103. Tashakkori A, Teddlie C. *Applied social research methods series, Vol. 46. Mixed methodology - Combining qualitative and quantitative approaches.* SAGE Publications Inc; 1998.
104. Sutton A, Clowes M, Preston L, Booth A. Meeting the review family: exploring review types and associated information retrieval requirements. *Health Info Libr J.* 2019;36:202–22.
105. National Institute for Health Research. *NIHR evaluation, trials and studies. Glossary.* 2015. <http://www.nets.nihr.ac.uk/glossary/feasibility-studies>. Accessed 7 Oct 2020.

106. Mackenzie K, Such E, Norman P, Goyder E. The development, implementation and evaluation of interventions to reduce workplace sitting: a qualitative systematic review and evidence-based operational framework. *BMC Public Health*. 2018;18:833.
107. Mackenzie K, Such E, Norman P, Goyder E. Sitting less at work: A qualitative study of barriers and enablers in organisations of different size and sector. *BMC Public Health*. 2019;19:884.
108. Moher D, Liberati A, Tetzlaff J, Altman DG, Altman D. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*. 2009;6:e1000097. doi:10.1371/journal.pmed.1000097.
109. Gardner B, Smith L, Lorencatto F, Hamer M, Biddle SJ. How to reduce sitting time? A review of behaviour change strategies used in sedentary behaviour reduction interventions among adults. *Health Psychol Rev*. 2016;10:89–112.
110. Higgins JPT, Altman DG, Gøtzsche PC, Jüni P, Moher D, Oxman AD, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ*. 2011;343.
111. Sterne JA, Hernán MA, Reeves BC, Savović J, Berkman ND, Viswanathan M, et al. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *BMJ*. 2016;355.
112. Pluye P, Robert E, Cargo M, Bartlett G, O’Cathain A, Griffiths F, et al. Proposal: A mixed methods appraisal tool for systematic mixed studies reviews. Montreal; 2011. <http://mixedmethodsappraisaltoolpublic.pbworks.com>.
113. Critical Appraisal Skills Programme. CASP qualitative checklist. 2017. <http://www.casp-uk.net/checklists>.
114. Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med Res Methodol*. 2008;8. doi:10.1186/1471-2288-8-45.
115. Dixon-Woods M, Bonas S, Booth A, Jones DR, Miller T, Sutton AJ, et al. How can systematic reviews incorporate qualitative research? A critical perspective. *Qual Res*. 2006;6:27–44. doi:10.1177/1468794106058867.
116. Morris SB. Estimating effect sizes from pretest-posttest-control group designs. *Organ Res methods*. 2008;11:364–86. doi:10.1177/1094428106291059.
117. Chau JY, Sukala W, Fedel K, Do A, Engelen L, Kingham M, et al. More standing and just as productive: effects of a sit-stand desk intervention on call center workers’ sitting, standing, and productivity at work in the Opt to Stand pilot study. *Prev Med reports*. 2016;3:68–74.
118. Evans RE, Fawole HO, Sheriff SA, Dall PM, Grant PM, Ryan CG. Point-of-choice prompts to reduce sitting time at work: a randomized trial. *Am J Prev Med*. 2012;43:293–7. doi:10.1016/j.amepre.2012.05.010.
119. Graves LE, Murphy RC, Shepherd SO, Cabot J, Hopkins ND. Evaluation of sit-stand workstations in an office setting: a randomised controlled trial. *BMC Public Health*. 2015;15:1145. doi:10.1186/s12889-015-2469-8.
120. Healy GN, Eakin EG, Owen N, Lamontagne AD, Moodie M, Winkler EAH, et al. A cluster randomized controlled trial to reduce office workers’ sitting time: Effect on activity outcomes. *Med Sci Sports Exerc*. 2016;48:1787–97.
121. Pronk NP, Katz AS, Lowry M, Payfer JR. Reducing occupational sitting time and improving worker health: the Take-a-Stand Project, 2011. *Prev Chronic Dis*. 2012;9:e154. doi:10.5888.pcd9.110323.
122. Puig-Ribera A, Bort-Roig J, Gonzalez-Suarez AM, Martinez-Lemos I, Gine-Garriga M, Fortuno J, et al. Patterns of impact resulting from a ‘sit less, move more’ web-based program in sedentary office employees. *PLoS One*. 2015;10:e0122474.
123. Urda JL, Lynn JS, Gorman A, Larouere B. Effects of a minimal workplace intervention to reduce sedentary

- behaviors and improve perceived wellness in middle-aged women office workers. *J Phys Act Health*. 2016;13:838–44.
124. Brakenridge CL, Fjeldsoe BS, Young DC, Winkler EAH, Dunstan DW, Straker LM, et al. Evaluating the effectiveness of organisational-level strategies with or without an activity tracker to reduce office workers' sitting time: A cluster-randomised trial. *Int J Behav Nutr Phys Act*. 2016;13:115.
125. Donath L, Faude O, Schefer Y, Roth R, Zahner L. Repetitive daily point of choice prompts and occupational sit-stand transfers, concentration and neuromuscular performance in office workers: an RCT. *Int J Environ Res Public Health*. 2015;12:4340–53.
126. Swartz AM, Rote AE, Welch WA, Maeda H, Hart TL, Cho YI, et al. Prompts to disrupt sitting time and increase physical activity at work, 2011-2012. *Prev Chronic Dis*. 2014;11:e73. doi:10.5888/pcd11.130318.
127. Gilson ND, Suppini A, Ryde GC, Brown HE, Brown WJ. Does the use of standing “hot” desks change sedentary work time in an open plan office? *Prev Med (Baltim)*. 2012;54:65–7. doi:10.1016/j.ypmed.2011.10.012.
128. Gorman E, Ashe MC, Dunstan DW, Hanson HM, Madden K, Winkler EAH, et al. Does an “activity-permissive” workplace change office workers' sitting and activity time? *PLoS One*. 2013;8:e76723. doi:10.1371/journal.pone.0076723.
129. Jancey JM, McGann S, Creagh R, Blackford KD, Howat P, Tye M. Workplace building design and office-based workers' activity: a study of a natural experiment. *Aust N Z J Public Health*. 2016;40:78–82. doi:10.1111/1753-6405.12464.
130. Priebe CS, Spink KS. Less sitting and more moving in the office: Using descriptive norm messages to decrease sedentary behavior and increase light physical activity at work. *Psychol Sport Exerc*. 2015;19:76–84. doi:10.1016/j.psychsport.2015.02.008.
131. Richards R, Brain K. Small-scale feasibility study to evaluate the effects of the ‘On Your Feet Britain’ campaign in a higher education institution setting. University of Cardiff, Cardiff; 2015.
132. Brakenridge CL, Fjeldsoe BS, Young DC, Winkler EAH, Dunstan DW, Straker LM, et al. Organizational-level strategies with or without an activity tracker to reduce office workers' sitting time: Rationale and study design of a pilot cluster-randomized trial. *JMIR Res Protoc*. 2016;5:e73.
133. Dunstan DW, Wiesner G, Eakin EG, Neuhaus M, Owen N, LaMontagne AD, et al. Reducing office workers' sitting time: rationale and study design for the Stand Up Victoria cluster randomized trial. *BMC Public Health*. 2013;13:1057. doi:10.1186/1471-2458-13-1057.
134. De Cocker K, De Bourdeaudhuij I, Cardon G, Vandelanotte C. Theory-driven, web-based, computer-tailored advice to reduce and interrupt sitting at work: development, feasibility and acceptability testing among employees. *BMC Public Health*. 2015;15:959. doi:10.1186/s12889-015-2288-y.
135. Chau JY, Daley M, Srinivasan A, Dunn S, Bauman AE, van der Ploeg HP. Desk-based workers' perspectives on using sit-stand workstations: a qualitative analysis of the Stand@Work study. *BMC Public Health*. 2014;14:752.
136. Dutta N, Walton T, Pereira MA. Experience of switching from a traditional sitting workstation to a sit-stand workstation in sedentary office workers. *Work*. 2015;52:83–9. doi:10.3233/WOR-141971.
137. Leavy J, Jancey J. Stand by me: qualitative insights into the ease of use of adjustable workstations. *AIMS Public Heal*. 2016;3:644–62.
138. Stephens SK, Winkler EAH, Trost SG, Dunstan DW, Eakin EG, Chastin SFM, et al. Intervening to reduce workplace sitting time: how and when do changes to sitting time occur? *Br J Sports Med*. 2014;48:1037–42. doi:10.1136/bjsports-2014-093524.

139. Healy GN, Goode A, Schultz D, Lee D, Leahy B, Dunstan DW, et al. The BeUpstanding Program (TM): Scaling up the Stand Up Australia workplace intervention for translation into practice. *AIMS Public Heal*. 2016;3:341–7.
140. Gorman E. Sedentary time in the workplace: a natural experiment of the transition to an activity-permissive workplace physical environment - Dissertation Thesis. University of British Columbia, Vancouver; 2012.
141. Chau JY, van der Ploeg HP, Merom D, Chey T, Bauman AE. Cross-sectional associations between occupational and leisure-time sitting, physical activity and obesity in working adults. *Prev Med (Baltim)*. 2012;54:195–200.
142. Cohen J. *Statistical power analysis for the behavioral sciences*. L. Erlbaum Associates; 1988.
143. Buckley JP, Hedge A, Yates T, Copeland RJ, Loosemore M, Hamer M, et al. The sedentary office: An expert statement on the growing case for change towards better health and productivity. *Br J Sports Med*. 2015;49:1357–62.
144. Goetzel RZ, Ozminkowski RJ. The health and cost benefits of work site health-promotion programs. *Annu Rev of Public Health*. 2008;29:303–23.
145. Thorp AA, Kingwell BA, Owen N, Dunstan DW. Breaking up workplace sitting time with intermittent standing bouts improves fatigue and musculoskeletal discomfort in overweight/obese office workers. *Occup Environ Med*. 2014;71:765–71. doi:10.1136/oemed-2014-102348.
146. NICE. *Physical activity in the workplace PH13*. London; 2008. <https://www.nice.org.uk/guidance/ph13/resources/physical-activity-in-the-workplace-pdf-1996174861765>.
147. Waters LA, Galichet B, Owen N, Eakin E. Who participates in physical activity intervention trials? *J Phys Act Health*. 2011;8:85–103.
148. Edwardson CL, Yates T, Biddle SJH, Davies MJ, Dunstan DW, Esliger DW, et al. Effectiveness of the stand more at (SMaRT) work intervention: Cluster randomised controlled trial. *BMJ*. 2018;363:3870.
149. Hall J. Sit-stand desks as a strategy to reduce sitting and increase standing and physical activity in office-based employees: a pilot RCT and process evaluation of a multicomponent workplace intervention - Dissertation Thesis. Brunel University; 2017.
150. Such E, Mutrie N. Using organisational cultural theory to understand workplace interventions to reduce sedentary time. *Int J Heal Promot Educ*. 2017;55:18–29.
151. Mullane SL, Toledo MJL, Rydell SA, Feltes LH, Vuong B, Crespo NC, et al. Social ecological correlates of workplace sedentary behavior. *Int J Behav Nutr Phys Act*. 2017;14:117. doi:10.1186/s12966-017-0576-x.
152. Petticrew M, Rehfuess E, Noyes J, Higgins JPT, Mayhew A, Pantoja T, et al. Synthesizing evidence on complex interventions: how meta-analytical, qualitative, and mixed-method approaches can contribute. *J Clin Epidemiol*. 2013;66:1230–43. doi:10.1016/j.jclinepi.2013.06.005.
153. Weiner BJ, Lewis MA, Linnan LA. Using organization theory to understand the determinants of effective implementation of worksite health promotion programs. *Health Educ Res*. 2008;24:292–305. doi:10.1093/her/cyn019.
154. Gilson ND, Burton NW, van Uffelen JGZ, Brown WJ. Occupational sitting time: Employees' perceptions of health risks and intervention strategies. *Health Promot J Austr*. 2011;22:38–43.
155. De Cocker K, Veldeman C, De Bacquer D, Braeckman L, Owen N, Cardon G, et al. Acceptability and feasibility of potential intervention strategies for influencing sedentary time at work: focus group interviews in executives and employees. *Int J Behav Nutr Phys Act*. 2015;12:22.

156. Morris A, Id RM, Shepherd S, Graves L. Multi-stakeholder perspectives of factors that influence contact centre call agents' workplace physical activity and sedentary behaviour. 2018;15:1484.
157. Hadgraft NT, Brakenridge CL, LaMontagne AD, Fjeldsoe BS, Lynch BM, Dunstan DW, et al. Feasibility and acceptability of reducing workplace sitting time: A qualitative study with Australian office workers. BMC Public Health. 2016;16:933.
158. Cole JA, Tully MA, Cupples ME. "They should stay at their desk until the work's done": A qualitative study examining perceptions of sedentary behaviour in a desk-based occupational setting. BMC Res Notes. 2015;8:683. doi:10.1186/s13104-015-1670-2.
159. Waters CN, Ling EP, Chu AHY, Ng SHX, Chia A, Lim YW, et al. Assessing and understanding sedentary behaviour in office-based working adults: A mixed-method approach. BMC Public Health. 2016;16:360. doi:10.1186/s12889-016-3023-z.
160. Hadgraft NT, Brakenridge CL, Dunstan DW, Owen N, Healy GN, Lawler SP. Perceptions of the acceptability and feasibility of reducing occupational sitting: Review and thematic synthesis. Int J Behav Nutr Phys Act. 2018;15:90.
161. Owen N, Sugiyama T, Eakin EE, Gardiner PA, Tremblay MS, Sallis JF. Adults' sedentary behavior determinants and interventions. Am J Prev Med. 2011;41:189–96. doi:10.1016/j.amepre.2011.05.013.
162. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K, editors. Health behavior and health education: Theory, research, and practice. 5th edition. San Francisco, CA, US: Jossey-Bass; 2015. p. 43–64.
163. Green J, Thorogood N. Qualitative methods for health research. 4th edition. London: SAGE Publications UK: London, England; 2018.
164. Kitzinger J. Qualitative research. Introducing focus groups. BMJ. 1995;311:299–302. doi:10.1136/BMJ.311.7000.299.
165. Irani Z, Beskese A, Love PED. Total quality management and corporate culture: constructs of organisational excellence. Technovation. 2004;24:643–50.
166. Olsen HM, Brown WJ, Kolbe-Alexander T, Burton NW. Flexible work: the impact of a new policy on employees' sedentary behaviour and physical activity. J Occup Environ Med. 2018;60:23–8.
167. Kelliher C, Anderson D. Doing more with less? Flexible working practices and the intensification of work. Hum Relations. 2010;63:83–106.
168. Olsen HM, Brown WJ, Kolbe-Alexander T, Burton NW. Physical activity and sedentary behaviour in a flexible office-based workplace: Employee perceptions and priorities for change. Heal Promot J Aust. 2018;29:344–52.
169. Office for National Statistics. Coronavirus and homeworking in the UK labour market: 2019. 2019. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/coronavirusandhomeworkingintheuklabourmarket/2019>. Accessed 25 Aug 2020.
170. Office for National Statistics. Coronavirus and homeworking in the UK: April 2020. 2020. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/coronavirusandhomeworkingintheuk/april2020>. Accessed 25 Aug 2020.
171. Johns G. Presenteeism in the workplace: A review and research agenda. J Organ Behav. 2009;31:519–42. doi:10.1002/job.630.
172. Myers M. Qualitative research and the generalizability question: standing firm with proteus. Qual Rep. 2000;4.

173. Smith B. Generalizability in qualitative research: misunderstandings, opportunities and recommendations for the sport and exercise sciences. *Qual Res Sport Exerc Heal*. 2018;10:137–49.
174. Hoddinott P. A new era for intervention development studies. *Pilot Feasibility Stud*. 2015;1:36. doi:10.1186/s40814-015-0032-0.
175. Sallis JF, Cervero RB, Ascher W, Henderson KA, Kraft MK, Kerr J. An ecological approach to creating active living communities. *Annu Rev Public Heal*. 2006;27:297–322.
176. Needham C, Carr S. SCIE Research Briefing 31: Co-production: an emerging evidence base for adult social care transformation. London; 2009.
177. Think Local Act Personal. Co-production. <https://www.thinklocalactpersonal.org.uk/co-production-in-commissioning-tool/co-production/>. Accessed 6 Feb 2019.
178. Standards NO. SFHMH63: Work with people and significant others to develop services to improve their mental health. UK; 2013. <https://tools.skillsforhealth.org.uk/competence/show/html/id/3833/>.
179. Social Care Institute for Excellence. Co-production in social care: What is it and how to do it. SCIE Guide 51. London; 2015.
180. Wight D, Wimbush E, Jepson R, Doi L. Six steps in quality intervention development (6SQuID). *J Epidemiol Community Health*. 2015;70:520–5.
181. Beckett K, Farr M, Kothari A, Wye L, le May A. Embracing complexity and uncertainty to create impact: Exploring the processes and transformative potential of co-produced research through development of a social impact model. *Heal Res Policy Syst*. 2018;16:118. doi:10.1186/s12961-018-0375-0.
182. Hawkins J, Madden K, Fletcher A, Midgley L, Grant A, Cox G, et al. Development of a framework for the co-production and prototyping of public health interventions. *BMC Public Health*. 2017;17:689. doi:10.1186/s12889-017-4695-8.
183. Hall J, Morton S, Hall J, Clarke DJ, Fitzsimons CF, English C, et al. A co-production approach guided by the behaviour change wheel to develop an intervention for reducing sedentary behaviour after stroke. *Pilot Feasibility Stud*. 2020;6:115.
184. Cameron J, Pidd K, Roche A, Lee N, Jenner L. A co-produced cultural approach to workplace alcohol interventions: barriers and facilitators. *Drugs Educ Prev Policy*. 2019;26:401–11.
185. Michalko M. *Thinkertoys: A handbook of creative-thinking techniques*. 2nd edition. New York: Ten Speed Press; 2006.
186. Mote J, Jordan G, Hage J, Hadden W, Clark A. Too big to innovate? Exploring organizational size and innovation processes in scientific research. *Sci Public Policy*. 2016;43:332–7.
187. Vaccaro IG, Jansen JJP, Van FAJ, Bosch D, Volberda HW. Management innovation and leadership: The moderating role of organizational size. *J Manag Stud*. 2012;49:28–51. doi:10.1111/j.1467-6486.2010.00976.x.
188. Verdonk P, Seesing H, De Rijk A. Doing masculinity, not doing health? a qualitative study among dutch male employees about health beliefs and workplace physical activity. *BMC Public Health*. 2010;10:1–14.
189. Molanorouzi K, Khoo S, Morris T. Motives for adult participation in physical activity: Type of activity, age, and gender Health behavior, health promotion and society. *BMC Public Health*. 2015;15:66.
190. Josefy M, Kuban S, Ireland RD, Hitt MA. All things great and small: Organizational size, boundaries of the firm, and a changing environment. *Acad Manag Ann*. 2015;9:715–802.
191. Bauman A, Nutbeam D. *Evaluation in a nutshell: A practical guide to the evaluation of health promotion*

- programs. 2nd edition. North Ryde: McGraw-Hill Education; 2014.
192. Carroll C, Patterson M, Wood S, Booth A, Rick J, Balain S. A conceptual framework for implementation fidelity. *Implement Sci.* 2007;2:40.
193. Montgomery P, Underhill K, Gardner F, Operario D, Mayo-Wilson E. The Oxford Implementation Index: a new tool for incorporating implementation data into systematic reviews and meta-analyses. *J Clin Epidemiol.* 2013;66:874–82.
194. Grant A, Treweek S, Dreischulte T, Foy R, Guthrie B. Process evaluations for cluster-randomised trials of complex interventions: a proposed framework for design and reporting. *Trials.* 2013;14:15.
195. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health.* 1999;89:1322–7.
196. Thabane L, Cambon L, Potvin L, Pommier J, Kivits J, Minary L, et al. Population health intervention research: what is the place for pilot studies? *Trials.* 2019;20:309.
197. Edwardson CL, Winkler EAH, Bodicoat DH, Yates T, Davies MJ, Dunstan DW, et al. Considerations when using the activPAL monitor in field-based research with adult populations. *J Sport Heal Sci.* 2017;6:162–78. doi:10.1016/J.JSHS.2016.02.002.
198. Kozey-Keadle S, Libertine A, Staudenmayer J, Freedson P. The feasibility of reducing and measuring sedentary time among overweight, non-exercising office workers. *J Obes.* 2012;2012:282303.
199. Grant PM, Ryan CG, Tigbe WW, Granat MH. The validation of a novel activity monitor in the measurement of posture and motion during everyday activities. *Br J Sports Med.* 2006;40:992–7.
200. Lyden K, Kozey Keadle SL, Staudenmayer JW, Freedson PS. Validity of two wearable monitors to estimate breaks from sedentary time. *Med Sci Sports Exerc.* 2012;44:2243–52.
201. Booth M. Assessment of physical activity: an international perspective. *Res Q Exerc Sport.* 2000;71 Suppl 2:114–20. doi:10.1080/02701367.2000.11082794.
202. Chau JY, der Ploeg HP, Dunn S, Kurko J, Bauman AE. Validity of the occupational sitting and physical activity questionnaire. *Med Sci Sports Exerc.* 2012;44:118–25.
203. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): Conceptual framework and item selection. *Med Care.* 1992;30:473–83.
204. Kessler R, Barber C, Beck A, Berglund P, Cleary P, McKenas D, et al. The World Health Organization health and work performance questionnaire (HPQ). *J Occup Environ Med.* 2003;45:156–74. doi:DOI: 10.1097/01.jom.0000052967.43131.51.
205. Guidelines for data processing and analysis of the International Physical Activity Questionnaire (IPAQ) – short and long forms. 2005. <http://www.ipaq.ki.se/scoring.pdf>. Accessed 14 Jun 2019.
206. RAND. 36-Item Short Form survey (SF-36) scoring instructions. https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html. Accessed 1 Jul 2019.
207. Morris AS, Murphy RC, Shepherd SO, Healy GN, Edwardson CL, Graves LEF. A multi-component intervention to sit less and move more in a contact centre setting: a feasibility study. *BMC Public Health.* 2019;19:292.
208. Quintiliani L, Sattelmair J, Sorenson G. The workplace as a setting for interventions to improve diet and promote physical activity. Geneva; 2008. <https://www.who.int/dietphysicalactivity/Quintiliani-workplace-as-setting.pdf?ua=1>. Accessed 6 Oct 2020.

209. Williams SJ, Snow DM. Promoting health in small and medium-sized enterprises. *J Small Bus Enterp Dev*. 2012;19:729–44.
210. Phillips K, Stokols D, McMahan S, Grzywacz JG. Strategies for health promotion in small businesses. *Am J Heal Promot*. 2004;18:suppl 1-7.
211. Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *Lancet*. 2010;376:1261–71.
212. Jerejian ACM, Reid C, Rees CS. The contribution of email volume, email management strategies and propensity to worry in predicting email stress among academics. *Comput Human Behav*. 2013;29:991–6.
213. Farr M. Power dynamics and collaborative mechanisms in co-production and co-design processes. *Crit Soc Policy*. 2018;38:623–44.
214. Chaddha V. Corporate restructuring and its effect on employee morale and performance. *Int J Res IT*. 2016;6:6–14.
215. Rogers EM. *Diffusion of Innovations*. 3rd edition. New York: The Free Press, A Division of Macmillan Publishing Co., Inc; 1983.
216. Newton J, Dooris M, Wills J. Healthy universities: An example of a whole-system health-promoting setting. *Glob Health Promot*. 2016;23 1_suppl:57–65.
217. Pearce CL, Manz CC. The new silver bullets of leadership: The importance of self-and shared leadership in knowledge work. *Organ Dyn*. 2005;34:130–40.
218. Chau JY, Engelen L, Burks-Young S, Daley M, Maxwell J-K, Milton K, et al. Perspectives on a ‘sit less, move more’ intervention in Australian emergency call centres. *AIMS Public Heal*. 2016;3:288–97.
219. Lucas A, Wade M, Wagstaff C. Physical activity programmes in the workplace and the role of organisational culture: A systematic review of current evidence (pre-print). *SportRxiv*. 2020.
220. Chau J, Engelen L, Kolbe-Alexander T, Young S, Olsen H, Gilson N, et al. “In initiative overload”: Australian perspectives on promoting physical activity in the workplace from diverse industries. *Int J Environ Res Public Health*. 2019;16:516.
221. O’Dolan C, Grant M, Lawrence M, Dall P. A randomised feasibility study to investigate the impact of education and the addition of prompts on the sedentary behaviour of office workers. *Pilot Feasibility Stud*. 2018;4:33.
222. Schein EH. *Organizational culture and leadership*. 4th edition. San Francisco: Jossey-Bass; 2010.
223. Blue S, Shove E, Carmona C, Kelly MP. Theories of practice and public health: Understanding (un)healthy practices. *Crit Public Health*. 2016;26:36–50.
224. Hampton S, Adams R. Behavioural economics vs social practice theory: Perspectives from inside the United Kingdom government. *Energy Res Soc Sci*. 2018;46:214–24.
225. Shove E, Pantzar M, Watson M. *The dynamics of social practice*. London: SAGE Publications Ltd; 2012.
226. Larsen J. The making of a pro-cycling city: Social practices and bicycle mobilities. *Environ Plan A*. 2017;49:876–92.
227. Spotswood F, Chatterton T, Tapp A, Williams D. Analysing cycling as a social practice: An empirical grounding for behaviour change. *Transp Res Part F Traffic Psychol Behav*. 2015;29:22–33.
228. Sahakian M, Wilhite H. Making practice theory practicable: Towards more sustainable forms of consumption. *J Consum Cult*. 2014;14:25–44.

229. Crosbie T, Guy S. En'lightening' energy use: The co-evolution of household lighting practices. *Int J Environ Technol Manag.* 2008;9:220–35.
230. Palmer VJ, Gray CM, Fitzsimons CF, Mutrie N, Wyke S, Deary IJ, et al. What do older people do when sitting and why? Implications for decreasing sedentary behavior. *Gerontologist.* 2019;59:686–97.
231. Pucher J, Buehler R. Making cycling irresistible: Lessons from the Netherlands, Denmark and Germany. *Transp Rev.* 2008;28:495–528.
232. Dewitt S, Hall J, Smith L, Buckley JP, Biddle SJH, Mansfield L, et al. Office workers' experiences of attempts to reduce sitting-time: An exploratory, mixed-methods uncontrolled intervention pilot study. *BMC Public Health.* 2019;19:819.
233. Fuller T, Tian Y. Social and symbolic capital and responsible entrepreneurship: An empirical investigation of SME narratives. *J Bus Ethics.* 2006;67:287–304.
234. Cocker F, Martin A, Scott J, Venn A, Sanderson K. Psychological distress, related work attendance, and productivity loss in small-to-medium enterprise owner/managers. *Int J Environ Res Public Health.* 2013;10:5062–82.
235. Adler PS, Borys B. Two types of bureaucracy: Enabling and coercive. *Adm Sci Q.* 1996;41:61–89.
236. Berninger NM, Ten Hoor GA, Plasqui G, Kok G, Peters G-JY, Ruiters RAC. Sedentary work in desk-dominated environments: A data-driven intervention using intervention mapping. *JMIR Form Res.* 2020;4:e14951.
237. MacDonald B, Gibson A-M, Janssen X, Kirk A. A mixed methods evaluation of a digital intervention to improve sedentary behaviour across multiple workplace settings. *Int J Environ Res Public Health.* 2020;17:4538.
238. Huang Y, Benford S, Price D, Patel R, Li B, Ivanov A, et al. Using internet of things to reduce office workers' sedentary behavior: Intervention development applying the behavior change wheel and human-centered design approach. *JMIR mHealth uHealth.* 2020;8:e17914.
239. Nicolson GH, Hayes C, Darker C. A theory-based multicomponent intervention to reduce occupational sedentary behaviour in professional male workers: p Protocol for a cluster randomised crossover pilot feasibility study. *Pilot Feasibility Stud.* 2020;6:175.
240. King AC, Whitt-Glover MC, Marquez DX, Buman MP, Napolitano MA, Jakicic J, et al. Physical activity promotion: Highlights from the 2018 physical activity guidelines advisory committee systematic review. *Med Sci Sports Exerc.* 2019;51:1340–53.
241. Baert S, Lippens L, Moens E, Sterkens P, Weytjens J. The COVID-19 crisis and telework: A research survey on experiences, expectations and hopes - IZA Discussion Paper No 13229. 2020.
242. Molino M, Ingusci E, Signore F, Manuti A, Giancaspro ML, Russo V, et al. Wellbeing costs of technology use during Covid-19 remote working: An investigation using the Italian translation of the technostress creators scale. *Sustain.* 2020;12:5911.
243. Davis KG, Kotowski SE, Daniel D, Gerding T, Naylor J, Syck M. The home office: Ergonomic lessons from the "new normal." *Ergon Des Q Hum Factors Appl.* 2020;28:4–10.
244. Donthu N, Gustafsson A. Effects of COVID-19 on business and research. *J Bus Res.* 2020;117:284–9.
245. HM Government. Offices and contact centres - Working safely during coronavirus (COVID-19) - Guidance - GOV.UK. 2020. <https://www.gov.uk/guidance/working-safely-during-coronavirus-covid-19/offices-and-contact-centres>. Accessed 4 Nov 2020.
246. Wilson JM, Lee J, Fitzgerald HN, Oosterhoff B, Sevi B, Shook NJ. Job insecurity and financial concern during

the COVID-19 pandemic are associated with worse mental health. *J Occup Environ Med.* 2020;62:686–91.

247. Gardner B, Dewitt S, Smith L, Buckley JP, Biddle SJH, Mansfield L. The ReSiT study (reducing sitting time): Rationale and protocol for an exploratory pilot study of an intervention to reduce sitting time among office workers. *Pilot Feasibility Stud.* 2017;3:47.

248. National Institute for Health Research and Involve. Briefing note three: Why involve members of the public in research? <https://www.invo.org.uk/posttypresource/why-should-members-of-the-public-be-involved-in-research/>. Accessed 7 Nov 2020.

249. Pandey SK, Kingsley GA. Examining red tape in public and private organizations: Alternative explanations from a social psychological model. *J Public Adm Res Theory.* 2000;10:779–800.



The
University
Of
Sheffield.

Appendices relating to the following thesis

“Sit Less at Work” interventions: exploring contextual factors which influence their development, implementation and evaluation

By:

Kelly Josephine Mackenzie

A thesis submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

The University of Sheffield
Faculty of Medicine and Dentistry
School of Health and Related Research

March 2021

Appendix 1

a: Public involvement recruitment post



If so, would you like the opportunity to give advice on a planned research project?

I'm looking for volunteers who **sit for long periods at work** who may be interested in joining a panel to advise on research to **reduce the amount of time spent sitting in the workplace**

Further Information

Wanted: Members of public to join a panel to give advice on a planned research project

- *Do you work in a job that requires you to spend most of your day sitting?*
- *Do you live within the South Yorkshire area?*
- *Do you want to influence research which plans to look into ways of reducing sitting time in the workplace?*

When developing research, it is important to understand the needs of those to be affected by the research. For this reason, I want to ask members of public with experience of sitting for long periods at work to act as advisors to this planned research.

The research plan will be submitted to the National Institute of Health Research (a funding organisation) in January 2016 by Kelly Mackenzie, a Public Health Researcher and, if accepted, will be carried out at the University of Sheffield.

What would involvement in this panel mean for you?

- You would be working in partnership with other members of the public and researchers to advise on the appropriateness and highlight any issues with the research plan.
- You do not need any previous experience, just a willingness to attend a one-off panel meeting and give your perspective on the planned research.
- Travel expenses will be reimbursed, and you will be offered £30 as a thank you for giving-up your time to attend the panel meeting.

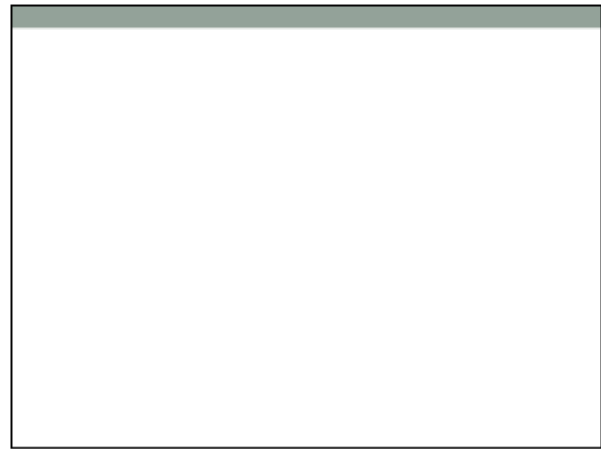
If you are interested in being involved, please contact Kelly Mackenzie on kelly.mackenzie@sheffield.ac.uk or 07740786072 for more information

b: Public involvement initial presentation and related handouts

Presentation

**PLANNED WORKPLACE SITTING RESEARCH
PUBLIC INVOLVEMENT PANEL**


Dr Kelly Mackenzie



INTRODUCTIONS

What is expected from you today?

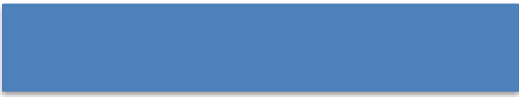
Reason for this meeting



Members of public can be involved in every stage of the research cycle to ensure that the research is useful & appropriate

Why is it important to carry out research into workplace sitting?

- Prolonged sitting influences health, regardless of how much physical activity/exercise you undertake



- Workplace sitting significantly contributes to daily sitting time, but currently there is limited UK-based research into ways of reducing this = **GAP IN OUR KNOWLEDGE**
- **BUT** to encourage employers to support any changes to workplace sitting, they must be simple & low-cost

AIM OF THIS PLANNED RESEARCH

To develop, test & assess how practical a low-cost package of changes is in reducing workplace sitting time within a range of workplaces

The research plan

- Phase 1: Interviews
 - Small groups of volunteers will be interviewed to establish their thoughts on what prevents them from reducing their sitting time at work or what helps them
- Phase 2: Develop a package of changes
 - Findings from the interviews will be used, alongside a group of volunteers from each workplace to develop the package
 - Management support at this stage is key
 - What will this package of changes look like? Prototype
- Phase 3: Test the package of changes
 - To run for between 8-12 weeks
 - Measures will include: sitting time, physical activity, health & work-related measures, costs, interviews with staff to determine their thoughts on the package of changes & its usefulness

YOUR FEEDBACK

See handout 1

PLAIN ENGLISH SUMMARY ACTIVITY

See handout 2

WHAT NEXT?

See handout 3

EVALUATION

THANK YOU!!



Workplace Sitting: Public Involvement Panel

Questions

Is the research proposal a good / useful research topic?

Do you think there needs to be any changes / are there any issues with the planned research? This is particularly with reference to:

- The types of organisations that should be involved
- How to recruit participants
- The length of time the package should run for
- The device to be used for measuring sitting time
- When data collection should be carried out

How do you think you / other members of the public could be involved in the research process going forward?

Acceptability and feasibility of a low-cost, co-produced intervention to reduce workplace sitting time in a range of workplace settings

Background

Sitting for long periods is linked to higher risks of health problems e.g., heart disease, diabetes, depression, neck / back problems, and early death. This link between sitting and health problems is present even for people who take part in regular exercise if they spend the rest of their day sitting. It is likely therefore that by replacing some sitting time with light activities, such as standing and walking, could be an important way to improve the health of the public as a whole.

Workplace sitting is a particular issue when thinking about how to reduce the amount of time spent sitting. This is because of the increasing number of desk-based jobs where workers sit for an average of 6-hours in an 8-hour working day. Therefore, there is a need to develop, test and assess changes in the workplace aimed at reducing time spent sitting. However, to encourage employers to support such workplace changes, they must be simple, low-cost and not negatively impact on with the daily workflow.

Comments on background and aim:

Aim

This study aims to develop, test and assess how practical a low-cost package of changes to reduce sitting time at work is within different types of workplaces. The findings obtained in this study will be used to plan a larger trial to see whether such packages do reduce workplace sitting, which may then change health and safety policy and ultimately the way we work in the future.

Methods

Desk-based workers will be asked to take part in this study. Ideally, they will be from at least 2 organisations: one public sector e.g., a local council, and one private sector e.g., a bank. This will help make the findings more relevant to different types of workplaces.

This research project will be split into three phases:

Phase 1

Small groups of volunteers at each organisation will be interviewed to establish their thoughts on issues in their workplace that means they spend much of their day sitting and what could help them to sit for less time at work.

Phase 2

Findings from these interviews will be used to provide the basis for a package of changes to be developed aiming to reduce prolonged sitting in the workplace. The package will be developed with management support and with members of staff to ensure that the package is tailor-made to suit the specific needs of each organisation.

Although at this stage it is not known what this package of changes will look like it is likely to include:

- Posters/prompts to remind staff to sit less

- Emails with helpful tips of ways to sit less e.g., walking/standing meetings, regular breaks away from the desk
- A team element
- Support from management in the form of emails and "leading by example"
- Changes in the way the environment is used e.g., encouraging the use of toilets/printers/coffee rooms on different floors.

Phase 3

Once the packages have been developed for each organisation, they will be tested for x weeks. Information from volunteers in the study will be obtained at the start of the study and then at set intervals during and after the testing of the package and will include:

- Total daily sitting time and physical activity levels (measured using a small, lightweight, waterproof device placed on the thigh)
- Some health information: general health and wellbeing questionnaire; measures of weight/height/waist circumference; and a questionnaire to assess for anxiety/depression
- Some work-related information: sickness absence and a measure of how productive the participants are at work
- Small-group discussions with those taking part about: the package as a whole; how practical the different parts of the package were; what could be improved; and what did not work.

Comments on all three phases of methods:

Public Involvement

Members of the public who have volunteered to be on the public involvement panel will be actively involved in:

- Further shaping the design of the research study to ensure ongoing relevance of the work
- Establishing whether there are any potential issues with the methods to be used
- Commenting on the data collection tools and suggesting relevant data measures
- Supporting recruitment of volunteers by suggesting organisations to involve and how best to advertise recruitment
- Commenting upon participant information leaflets/consent forms.

Promoting the Findings

The findings from each phase of this study will be publicised using a variety of methods:

- Published in academic journals
- Presented at national and international conferences
- Presented to local and national organisations that supported this project, and members of the public via the public involvement panel, using word of mouth, local meetings and updates in newsletters/on websites.

Any other comments e.g., is the overall language use appropriate (is there any jargon or complex terminology), is it meaningful, is it practical etc?

Workplace Sitting: Public Involvement Panel

Further involvement

Follow-up telephone call as part of evaluation process within 2 weeks of this meeting.

You will receive two letters:

- One immediately after submission (end of January) to let you know how your contribution inputted into the application
- One to advise you on the outcome of the application submission (approx. 6 months from now).

If the grant application is successful, would you be interested in continued involvement in advising on the research process?

No need to commit as yet, just for consideration.

c: Initial public involvement meeting agenda



The
University
Of
Sheffield.

Workplace Sitting Research: Public Involvement Panel

Agenda

12.00-13.30 Wednesday 9th December 2015

White Rose Room, School of Health and Related Research (SchARR), Regent Court (2nd Floor), Regent Street, Sheffield S1 4DA

Tel: 07740 786072

Light lunch and refreshments provided

Chair: Kelly Mackenzie

1. Introductions
2. Reason for meeting explained
3. Background – importance of research into workplace sitting
4. Planned research plan
5. Suggested changes to the planned research from the floor (see handout 1)
6. Activity – feedback on the plain English summary (see handout 2)
7. What will happen next? (see handout 3)
8. Evaluation and close

d: Summary of discussions from public involvement meetings

NB: A summary of the discussions from the first public involvement meeting is provided in Chapter 1, Section 1.5.1.

Second meeting (February 2017)

In attendance: Kelly Mackenzie (facilitating), plus five panel members

Introductions:

- Everyone introduced themselves
- Meeting rules discussed – anything sensitive discussed to remain in the room, research project can be discussed outside of the group
- £30 cash given out and signed for.

Presentation given by Kelly which covered:

- The reason for the meeting
- Background information as to why research into workplace sitting is important
- The research plan.

Activity 1 – advice regarding the recruitment email for Phase 1:

- Generally, needs to be snappier and more exciting.
- Advised that Kelly needs to sell the research more. In the first line, there needs to be a comment like “exciting new research project”, “it’s a unique opportunity”, “do you sit at your desk all day?”.
- Remove the phrase “multiple phases” as staff may feel that it will be a long, drawn out process and may be a barrier to volunteering. Instead, state something like “As part of Phase 1 of this research...” and “In the future, Phase 2 and 3 will...”.
- Need to highlight the health benefit of sitting less in the email – although there was an acknowledgement that this may also turn some people off. Could the statement “it is for those who go from doing no physical activity to doing something where the biggest gains in health are seen”.
- Could state something like “You may have heard in the media the issue of too much sitting...” to highlight it is a topical issue.
- To get a range of views, state that e.g., “I am looking for everyone’s views on the issue of sitting in the workplace – those of you who are active and those of you who are not”, or “I want to hear from everyone”. It was emphasised the importance of trying to get volunteers who may be “late adopters” or resistant to this change to try to understand their barriers to sitting less at work, not just those who are enthusiastic about their health. Could ask those who do volunteer to try to increase interest in this “harder to reach” group.
- Could break-up the text in the email so easier to read – maybe use subtitles.
- **Action: Kelly to re-write another recruitment email and send to the group for comment.**

Activity 2 – advice regarding the participant information sheet for Phase 1:

- The section relating to “it may be difficult to mask your involvement in the study from your line manager or your colleagues” needs rewording as sounds like a huge barrier to participation. It has negative connotations. Could amend to “it is likely that your colleagues/line manager will be aware that you are taking part in the study”.

- In Q7, reword the availability section to state that a Doodle Poll will be sent out or date options via Outlook (to be made in the body of the emails via voting dates).
- Q11 – “What if something goes wrong?” needs rewording so less negative.
- Remove “lead applicant” from bottom of leaflet and replace with “lead researcher”.
- **Action: Kelly to amend the participant information sheet and send to the group for comment.**

Third meeting (September 2017)

In attendance: Kelly Mackenzie (facilitating), plus six panel members

Introductions:

- Meeting rules discussed – anything sensitive discussed to remain in the room, research project can be discussed outside of the group
- £30 cash given out and signed for.

Presentation given by Kelly which covered:

- The reason for the meeting
- Recap of the research plan
- Plans for this meeting.

Activity 1 - suggestions for a large corporation:

- Bank – one of panel members works there
- Energy company – contact of one of the panel members works there

Activity 2 – advice on recruitment email and participant information sheet for Phase 2:

- Email
 - good – positive, encouraging
 - consider putting the project branding in the header of the email to make it instantly recognisable
- Participant information sheet
 - make it explicit that participants don’t need to make time up for involvement in the study or participating in the intervention
 - could remove point 8 re. possible benefits (as there are none)
 - in point 7 – typo – needs to be a space between “2” and “hours”
 - try to make PI leaflet shorter if possible

Activity 3 – advice on conducting Phase 2:

- 2 x 1-hour workshops were felt to be a feasible amount of time to ask of volunteers
- Make sure workshops are active and don’t encourage sitting, remove chairs
- Flipcharts around the room – allow participants to move around the room
- Provide some structure at the start of the session and then allow more flexibility in the running of the session – ensure I have a range of examples to provide to participants to give them some initial ideas
- One of panel members has a contact (John Batty at Blue John Marketing) who runs sessions on creative thinking – useful to make contact with him to get ideas of how to facilitate the workshops to get the most out of the participants

- Ideal timing would be mid-morning (although need to acknowledge that the decision on timing may be down to the employer) – may be able to fit in with team meetings if appropriate
- It was felt to be a reasonable request to ask participants to be workplace champions
- If no suggestions are elicited, need to have a back-up set to offer up to explore if they would work in that specific workplace
- Ensure that ground rules are established at the start of the session to clarify that everyone's views are valued and that there is no judgement
- Might be worth allowing everyone time to write down ideas first rather than speaking in front of the group – some participants may feel more comfortable with that
- Need to consider carefully whether have senior management involved in the workshops – depends a little on the organisational culture/corporate hierarchy – but regardless, it was acknowledged that it's important to have some form of management/senior decision makers buy-in to aid uptake of package of changes by staff and to help with the practicalities of implementation.

Fourth meeting (June 2018)

In attendance: Kelly Mackenzie (facilitating), plus five panel members

Introductions:

- Meeting rules discussed – anything sensitive discussed to remain in the room, research project can be discussed outside of the group
- £30 cash given out and signed for.

Presentation given by Kelly which covered:

- The reason for the meeting
- Recap of the research plan
- Plans for this meeting.

Activity 1 – advice regarding participant information sheets (x3) and recruitment emails (x3) for Phase 3:

- Typo noticed participant info sheets on page 1, question 2 “Phase 2 involved the development [of] a low-cost package of change...” – amended
- All read well – no additional comments
- Felt that with the recruitment emails – good to underline and bold the important bits as have done and use headings.

Activity 2 – advice regarding plans for Phase 3:

- Described plans for Phase 3 – explained that I would be using a “light-touch” approach and would have no input during the 12-week intervention period in order to replicate what would happen in real-life – although I did state that I would be contactable during the period in case there were any problems
- PPI group were concerned about this in terms of the fact this is a pilot study and there are likely to be teething problems and that there is a need for someone to take charge and it needs to be clear who that person(s) is in each organisation
- PPI group felt that there was a need for some sort of accountability and as such I should contact the person I leave in charge / a champion at the end of each 4 weeks to ask if everything is going ok and if

there are any problems and try to support that individual to overcome these issues. This information would also be useful in terms of the process evaluation.

Activity 3 – advice regarding questionnaires for Phase 3:

- In Questionnaire 1, Q2c – ask about e-cigarettes too
- Few typos noted and wrong question-links noted – amended
- Few issues in terms of language used e.g., “Pep” instead of “Energy” (ask about energy too later in the question), “VP sales” and “vacation” both very American – need to check with supervisors that ok to change these or will this unvalidated the questionnaire??

Fifth meeting (October 2018)

In attendance: Kelly Mackenzie (facilitating), plus seven panel members

Introductions:

- Meeting rules discussed – anything sensitive discussed to remain in the room, research project can be discussed outside of the group
- £30 cash given out and signed for.

Presentation given by Kelly which covered:

- The reason for the meeting
- Recap of the research plan
- Plans for this meeting.

Activity - Brainstormed ideas regarding topics to cover for post-intervention group discussions / interviews with:

1. Members of the intervention development group

- Was the intervention consistent with what you had planned?
- How many people do you think were involved? Any specific departments / teams / types of people more or less engaged?
- Were there any benefits of having a workplace champion?
- Can you provide a detailed list of actions – what actually happened?
- Feedback on what activities were good and what were less successful
- Who was driving the intervention? Was it one person or same group of people? Was there any absorption i.e., did others start to initiate activities after experiencing them?
- Did any different ideas or activities develop during the course of the intervention? In the workplace / home / leisure?
- Was there any push-back or resistance to activities or intervention as a whole?
- Culture – was the intervention encouraged, if so, who did this?
- Was there any discretionary effort i.e., autonomy to participate in the intervention rather than it being led or controlled?

2. Those who participated in the intervention and data collection

- Was there any branching out of the intervention external to the organisation e.g., if there were external meetings in other workplaces?
- What can happen after the intervention? How can it be maintained? What is its legacy?

- Are you simply reacting to activities because you are being told to do them or are you embedding them into your working lives?
- Do you have any thoughts as to why some people didn't engage with the intervention? How did that impact you? Did you find it harder to engage with the intervention if others were being negative about it?
- What were your thoughts about the various activities? Good, bad, challenging, how did they make you feel?
- Did the range of activities cover everyone? What about people who couldn't participate in different activities? Were individual activities or team-based activities preferred?
- What were your thoughts when the intervention was initially suggested? Positive or negative?
- What motivated you to get involved with this intervention?
- Was there support by management?
- Were there any barriers to any specific activities?
- Were there any habit-forming activities e.g., activities that you have managed to continue?
- How was information about the intervention communicated to you? Was it enough or too much?
- Were there any broader health impacts e.g., physically active outside of work, changes to diet?
- Homeworking – were there any barriers noted in terms of participating in the intervention?

3. Key personnel in the organisation

- Staff productivity
- What are the measures of success from your perspective – productivity, staff morale, health?
- Were there different rates of uptake in staff with different job roles / working patterns?
- What were the perceived costs and benefits of the intervention?
- Did you participate themselves? Were you leading / driving it? What were your initial thoughts about the intervention?
- What would convince you to participate / support the ongoing running of the intervention? What outputs do you need to see? Look at the Chartered Institute of Professional Development (CIPD) who are involved with awards – maybe important to gain some sort of recognition for organisation's participation?
- Is this intervention something you would be keen to adopt long-term? What is the potential to carry it on? Was it originally planned to just be a short-term commitment or were there plans for long-term rollout? Who is going to own it? Is there a benefit of using workplace champions to support the ongoing roll-out?
- Consider flexi-time in the context of an organisational cultural issue – how could this be overcome if identified as a barrier and how far did this impact on participation?
- Are there any other workplace policies that might impact the intervention in the future? E.g., something relating to disabled staff, equality and diversity, health and safety.
- What is the overall strategy in terms of foreseeable changes to how the organisation works and the impact this may have on the intervention in the future? Is the intervention a priority? Is the intervention part of the organisation's culture?
- Is there a reputational element? Having a dynamic working environment may encourage people to work for them.

e: Branding brief and feedback from public involvement panel

Project brief (sent to a local art and design college)

For the project, I am developing an intervention to try and encourage people to sit less in the workplace and am particularly targeting organisations who employ desk-based/office-based staff. The overall project is called "Sit Less at Work", but, as the intervention will be run in a range of different organisations, I'd also like the option for the word "Work" to not be included in the logo/branding and instead left blank for me to add each organisation's logo if that is what the organisations would like. The main message of the intervention is to reduce the staff's overall time spent sitting whilst at work in order to improve health (in terms of general health and wellbeing, but also improving a range of longer-term health problems such as heart disease, back/neck pains, diabetes, obesity and mental health). There doesn't necessarily need to be a clear association to health improvement included in the logo/brand, but I just wanted to provide that detail by way of background and in case it is helpful for the design process. The intervention will reduce staff's time spent sitting by encouraging standing and moving more at work. The intervention will use a variety of different methods to reduce sitting time which will be developed by the staff themselves (facilitated by me), and will likely include elements such as: reminders/prompts to sit less in the form of posters or downloadable computer software, having standing/walking meetings, having an hourly 2-minute standing/moving break, going for a walk at lunchtime, peer support/champions to encourage colleagues to sit less.

Essentially, what I'm after is a recognisable logo/brand that can be used both in print and web formats. Ideally, I'd like a "Sit Less at Work" logo, but also one with the word "Work" removed so that I can incorporate the organisations' logos. I'd also like the logos (both with and without the word "Work" to have the option of including a strapline too. I have no preference in terms of colours. The deadline would need to be the end of May/beginning of June 2018.

Public involvement panel feedback

Panel member 1

"I think the last logo with arms stretched up and the speech bubble is good but not sure about the colours... I also like the bum/heart idea - simple but effective."

Panel member 2

"I quite like the pink hearts. I use the Heart App on my iPhone as a rough guide. Apparently Black or White on Hot Pink are the most eye-catching colours.

Wording wise, I think the obesity thing has been done, but we don't see much about Death, Anxiety and Stress linked to sitting too much.

I like the say no to sitting playing on the smoking thing, but I don't think its practical. Those who have 'sitting jobs' – like me – still have to sit, unless the company reforms and replaces all desks to standing ones. So, I think it's more about focussing on walking around when you can in the environment, you're in – phone calls, lunch, before and after work etc."

Panel member 3

“If it is just branding and not the actual messages related then Image 1, I don’t like, too simplistic and reductive. Image 2 I like but perhaps the heart colours could be red amber green for what is good for you. Image 3 I like but the others are a bit childish. The colouring on his second is nice, very noticeable. The third one has “live strong” in the hook, that’s a Lance Armstrong motto, I’d avoid that. The 4th image overall is most complete for branding but that’s because they shoved it over different items. It does show forward thinking though.

Having looked at the brief I’d say the heart one is good but if it’s a logo it needs to be just 1 considering it wants to be recognisable again and again. Changing from an upwards, to sideways to upside down heart would not work in that sense. I don’t really get the jigsaw piece guy. I do think in terms of a logo then the last one is best. It looks like a strong character, upper body strength etc, compared to the jigsaw which has a big butt. I also like the fact the last one emphasises work and how it can have a benefit at home. That’s a good tagline. I’d go for that one. Last person has fully explored a good tag line, created a good logo and thought about branding.”

Panel member 4

“Re. the branding/logos - the Image 3 and Image 4 stand out most to me.

Image 4 - I like the simplicity of logo, the person looks free/unburdened (by sitting/chairs/desks!) and really like the blue/green colour scheme. I don't really know why, but these are colours would associate with health? And I see them as positive/encouraging colours.

Image 3 - I really like the three posters, if they were placed around [my workplace] they would catch my eye and I would be drawn to them. Whether the content is delivering the message you wish to get across I'm not sure, but I like the idea of them focusing on different elements of the project, as you are more likely to capture more people's interests if you promote different 'benefits' of the project?

For example, one person might be drawn to the project for its benefits on their posture, whilst someone else might be drawn to the benefits it may provide to their levels of activity.

What I also like is the example of the 'Sit less at Pearson' example provided. The 'Sit less at...' part of the logo still looks strong next to the more familiar company logo. Whereas with Image 4, I wonder if this may get 'lost' next to a strong company logo?

What I'm not sure of is the colour scheme between each poster, I think a similar colour scheme for each may be needed to tie them together? And just a personal note, I find yellows, blacks, browns in the posters not as pleasant to look at, and less 'health related'. If that makes sense.”

Panel member 5

“Image 4 - Clear, professional, good logo and appealing colours”

[Feedback to local art and design college on submissions](#)

Hi [college tutor],

I've had lots of really great feedback from my public involvement panel and personally I have to say that I am hugely impressed with what has been produced by the students.

Here's some feedback on all the designs (I'm not going to include the posters as it's going to be up to the participants in the research project to develop their own posters, although I did like some of the ideas put up!):

Image 1

Liked the idea of a logo and then a speech bubble however, there were some who thought the man looked like he was wearing a helmet (rather than smiling which I think was the intention). Also, there was no option provided to add a company logo to the Sit Less at Work logo which was part of the brief.

Image 2

Lots of people commented on the novelty of the images! They were fun, interesting and eye-catching. However, it was felt that you would need all three images to properly show the story and it really needs to be one image to meet the brief.

Image 3

Really liked the idea of being able to change colours to match a company logo and it was easily shown how a company logo could be included, which hit the brief well. Liked that the "head" of the character could be a different colour. It was felt that the logo was eye-catching and bold. However, there were comments about the figure, which was in the form of a jigsaw, that he actually looked fat, and immobile, which therefore didn't fit with the aim of the project.

Image 4

Examples were shown where a company logo could be included which fitted the brief. Feedback was that the figure looked dynamic and mobile, but the font and the line thickness used was not bold enough and could be lost on a page or next to a company logo and looked like it faded too much.

In summary, Images 1 and 2 were great, but just didn't quite address the brief fully. I really liked Image 3 in terms of the font (style and thickness) and the idea that the logo could change colour to suit a company logo if to be included. However, I preferred the character in Image 4 which captured the essence of the project a little better. Therefore, I'd like to choose Image 4 as the winner.

Thanks again for arranging all of this - they've all done a fantastic job making my decision very difficult!!

Best wishes,
Kelly

Appendix 2

a: PROSPERO Protocol

PROSPERO International prospective register of systematic reviews



Review title and timescale

1 Review title

Give the working title of the review. This must be in English. Ideally it should state succinctly the interventions or exposures being reviewed and the associated health or social problem being addressed in the review.

Understanding the contextual factors that influence implementation and/or effectiveness of interventions to reduce workplace sitting time in desk-based staff

2 Original language title

For reviews in languages other than English, this field should be used to enter the title in the language of the review. This will be displayed together with the English language title.

3 Anticipated or actual start date

Give the date when the systematic review commenced, or is expected to commence.

21/11/2016

4 Anticipated completion date

Give the date by which the review is expected to be completed.

29/09/2017

5 Stage of review at time of this submission

Indicate the stage of progress of the review by ticking the relevant boxes. Reviews that have progressed beyond the point of completing data extraction at the time of initial registration are not eligible for inclusion in PROSPERO. This field should be updated when any amendments are made to a published record.

The review has not yet started

| Review stage | Started | Completed |
|---|---------|-----------|
| Preliminary searches | Yes | No |
| Piloting of the study selection process | No | No |
| Formal screening of search results against eligibility criteria | No | No |
| Data extraction | No | No |
| Risk of bias (quality) assessment | No | No |
| Data analysis | No | No |

Provide any other relevant information about the stage of the review here.

Review team details

6 Named contact

The named contact acts as the guarantor for the accuracy of the information presented in the register record.

Kelly Mackenzie

7 Named contact email

Enter the electronic mail address of the named contact.

kelly.mackenzie@sheffield.ac.uk

8 Named contact address

Enter the full postal address for the named contact.

School of Health and Related Research, University of Sheffield, Regent Court, 30 Regent Street, Sheffield S1 4DA

9 Named contact phone number

Enter the telephone number for the named contact, including international dialling code.

00447740786072

10 Organisational affiliation of the review

Full title of the organisational affiliations for this review, and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.

School of Health and Related Research, University of Sheffield

Website address:

<https://www.sheffield.ac.uk/scharr>

11 Review team members and their organisational affiliations

Give the title, first name and last name of all members of the team working directly on the review. Give the organisational affiliations of each member of the review team.

| Title | First name | Last name | Affiliation |
|-----------|------------|-----------|---|
| Dr | Kelly | Mackenzie | School of Health and Related Research, University of Sheffield |
| Professor | Elizabeth | Goyder | School of Health and Related Research, University of Sheffield |

| | | | |
|-----------|-----------|--------|--|
| Professor | Paul | Norman | Department of Psychology, University of Sheffield |
| Dr | Elizabeth | Such | School of Health and Related Research, University of Sheffield |

12 Funding sources/sponsors

Give details of the individuals, organizations, groups or other legal entities who take responsibility for initiating, managing, sponsoring and/or financing the review. Any unique identification numbers assigned to the review by the individuals or bodies listed should be included.

National Institute for Health Research Doctoral Research Fellowship for lead researcher (KM) (DRF-2016-09-023)

13 Conflicts of interest

List any conditions that could lead to actual or perceived undue influence on judgements concerning the main topic investigated in the review.

Are there any actual or potential conflicts of interest?

None known

14 Collaborators

Give the name, affiliation and role of any individuals or organisations who are working on the review but who are not listed as review team members.



| Title | First name | Last name | Organisation details |
|-------|------------|-----------|----------------------|
|-------|------------|-----------|----------------------|

Review methods

15 Review question(s)

State the question(s) to be addressed / review objectives. Please complete a separate box for each question.

What are the contextual factors that influence the implementation (in terms of feasibility and acceptability) and effectiveness of interventions to reduce workplace sitting time in desk-based staff?

16 Searches

Give details of the sources to be searched, and any restrictions (e.g. language or publication period). The full search strategy is not required, but may be supplied as a link or attachment.

The following electronic databases will be searched: Web of Science; MEDLINE; PsycINFO; CINAHL. The searches will be limited to English language papers only. No restrictions will be placed on dates of publication. In addition, reference lists of included studies/reviews will be examined to identify further relevant studies. Grey literature will also be searched for by reviewing websites of relevant organisations (e.g. Sedentary Behaviour Research Network) and Google, Google Scholar and Mendeley.

17 URL to search strategy

If you have one, give the link to your search strategy here. Alternatively you can e-mail this to PROSPERO and we will store and link to it.

I give permission for this file to be made publicly available

18 Condition or domain being studied

Give a short description of the disease, condition or healthcare domain being studied. This could include health and wellbeing outcomes.

The domain that this review will study is sedentary behaviour in the workplace. Sedentary behaviour is specifically defined as any waking behaviour with an energy expenditure ≤ 1.5 Metabolic Equivalents whilst in a sitting or reclining posture (Marshall and Welk 2008). Furthermore, sedentary behaviour has been shown to be distinct from light intensity activities such as standing and walking, as the latter confer some health benefits (Dunstan et al. 2012; Hamilton et al. 2004). Sedentary behaviour can be most simply operationalised as sitting time (Marshall and Ramirez 2011). Recent evidence has highlighted that prolonged sitting is associated with poor health including an increased risk of cardiovascular disease, type 2 diabetes and all-cause mortality (Grøntved and Hu 2011). The workplace is a key setting to target prolonged sitting given the increase in desk-based jobs in recent decades leading to such employees sitting for an average of 77% of their working day (Thorp et al. 2012). Therefore, there is a need to develop effective interventions to reduce the amount of time employees spend sitting at work. There have been recent systematic reviews examining the effectiveness of interventions aimed at reducing workplace sitting (Chu et al. 2016; Shrestha et al. 2015). However, what have not been clearly described in the literature are the factors that might influence the implementation and/or effectiveness of such interventions. The Medical Research Council (Craig et al. 2008) states that when developing complex interventions, it is essential to gain a theoretical understanding of the likely process of change, which allows important factors to be identified and addressed during intervention development and implementation in order to enhance intervention effectiveness. This review therefore aims to systematically collate evidence on the contextual factors that may influence the implementation and/or effectiveness of interventions to reduce workplace sitting time.

19 Participants/population

Give summary criteria for the participants or populations being studied by the review. The preferred format includes details of both inclusion and exclusion criteria.

Employed adults (18 years or older) in desk-based jobs whose occupations involve spending the majority of their working time sitting at a desk e.g. administrative jobs, customer service, help-desk professions, call-centre workers, receptionists. Studies looking at sedentary behaviour that are not set in the workplace will be excluded.

20 Intervention(s), exposure(s)

Give full and clear descriptions of the nature of the interventions or the exposures to be reviewed

The exposure of interest is sedentary behaviour in the workplace. Any type of intervention with the primary aim of reducing workplace sitting time will be included. A range of different types of interventions have been studied including the use of adjustable height desks, prompts/reminders, walking/standing meetings, education/ counselling/ management support. Both single-level and multi-component interventions will be included. Workplace interventions with the primary aim of increasing physical activity and secondary aim to reduce sedentary behaviour will be excluded. This review aims to look specifically at contextual factors associated with the implementation and/or effectiveness of interventions to reduce workplace sitting time not to increase physical activity, as reducing sitting time may have its own issues that could be masked if looking at physical activity interventions e.g. lack of awareness of the health impacts of prolonged sitting. Furthermore, interventions where reducing sitting time has been a secondary aim have not been shown to be effective in changing this behaviour.

21 Comparator(s)/control

Where relevant, give details of the alternatives against which the main subject/topic of the review will be compared (e.g. another intervention or a non-exposed control group).

The use of a control group is not essential for this review. Studies both with and without a control group will be included.

22 Types of study to be included

Give details of the study designs to be included in the review. If there are no restrictions on the types of study design eligible for inclusion, this should be stated.

No limit will be placed on the type of studies to be included in this review. Essentially, any study type that has reported the relevant primary outcome, as described below, will be included. These may include: uncontrolled or controlled trials, randomised-controlled trials, qualitative studies, mixed methods, systematic reviews or narrative reviews. Papers that have reported intervention development only will be excluded.

23 Context

Give summary details of the setting and other relevant characteristics which help define the inclusion or exclusion criteria.

The context for this review is the workplace. Specifically, this review will focus on studies that have been undertaken within office-based workplaces where employees sit for the majority of their working day.

24 Primary outcome(s)

Give the most important outcomes.

The primary outcome will be workplace sitting time. This may be measured objectively using accelerometer devices for example, or subjectively using self-reported sitting logs or questionnaires. Only papers that have included a pre- and post-intervention measurement of workplace sitting time will be included.

Give information on timing and effect measures, as appropriate.

25 Secondary outcomes

List any additional outcomes that will be addressed. If there are no secondary outcomes enter None.

Other behavioural changes may also be collected if available reflective of the content of the intervention e.g. decreased sitting time outside of the workplace, increase in walking/standing meetings, any changes to the organisational approach to workplace sitting time and increase in physical activity in the workplace.

Give information on timing and effect measures, as appropriate.

26 Data extraction (selection and coding)

Give the procedure for selecting studies for the review and extracting data, including the number of researchers involved and how discrepancies will be resolved. List the data to be extracted.

Study selection and data extraction will be conducted by the lead researcher (KM). A bespoke, pre-piloted data extraction form will provide a consistent and rigorous process. To enhance trustworthiness of this review, a 10% sample of the papers found as a result of the search strategy plus any studies that give rise to any uncertainty will be independently checked by a second reviewer. Furthermore, a 10% sample of the papers for inclusion in the review will undergo data extraction by a second reviewer. Any disagreements will be resolved by discussion or the involvement of a third reviewer if needed. The data to be extracted will include: study design, study setting, participant characteristics and sample sizes, qualitative and quantitative outcomes. The outcomes data to be extracted will focus on identifying and exploring the contextual factors that may influence the implementation and/or effectiveness of interventions to reduce workplace sitting. Qualitative data relating to barriers, facilitators, mediators and moderators of an intervention will come from participant quotes i.e. first order constructs as a result of focus group discussions, interviews and surveys (if open question responses have been recorded). In addition, author interpretations, statements, assumptions and ideas i.e. second order constructs will be extracted, which may be found in both results and discussion sections of the papers. Furthermore, data regarding the context and details of the intervention used may be extracted from the methods and/or results sections of papers. Relevant quantitative information, such as participant numbers; and length, cost (if available) and effectiveness of the intervention used will also be collected and, where possible, effect sizes will be calculated. Missing data will be requested from study authors.

27 Risk of bias (quality) assessment

State whether and how risk of bias will be assessed, how the quality of individual studies will be assessed, and whether and how this will influence the planned synthesis.

The CASP checklists will be used for assessing the quality of each of the papers to be included in the review. The CASP checklist allows greater flexibility in terms of assessing a variety of study designs i.e. there is a different checklist for each type of study design, which is important in this review as there will be no limits placed on study design in the search strategy. Quality assessment will occur on the studies selected from the original searches to be included in the review only, not on the qualitative or quantitative data sourced from these studies. The quality assessment will be conducted by the lead researcher (KM) and a 10% sample will be independently checked by a second reviewer to enhance trustworthiness. Disagreements will be resolved by discussion and the inclusion of a third reviewer if required.

28 Strategy for data synthesis

Give the planned general approach to be used, for example whether the data to be used will be aggregate or at

the level of individual participants, and whether a quantitative or narrative (descriptive) synthesis is planned. Where appropriate a brief outline of analytic approach should be given.

The qualitative data will be synthesised using thematic analysis. This method of synthesis will allow an in-depth exploration of the research question to occur, ensuring that the review findings are grounded in the original data whilst allowing for new and emergent themes to develop. No pre-determined themes will be imposed on the data. Furthermore, patterns in the data can be identified across different studies. The quantitative data will be appropriately synthesised. If there are sufficient appropriate studies, quantitative studies will be synthesised through meta-analysis with moderator analyses. If meta-analyses is not possible, for example due to the heterogeneity of study designs and interventions used, a narrative synthesis will be performed.

29 Analysis of subgroups or subsets

Give any planned exploration of subgroups or subsets within the review. 'None planned' is a valid response if no subgroup analyses are planned.

None planned.

Review general information

30 Type and method of review

Select the type of review and the review method from the drop down list.

Qualitative synthesis, Systematic review

Public health (including social determinants of health)

31 Language

Select the language(s) in which the review is being written and will be made available, from the drop down list. Use the control key to select more than one language.

English

Will a summary/abstract be made available in English?

Yes

32 Country

Select the country in which the review is being carried out from the drop down list. For multi-national collaborations select all the countries involved. Use the control key to select more than one country.

England

33 Other registration details

Give the name of any organisation where the systematic review title or protocol is registered together with any unique identification number assigned. If extracted data will be stored and made available through a repository such as the Systematic Review Data Repository (SRDR), details and a link should be included here.

34 Reference and/or URL for published protocol

Give the citation for the published protocol, if there is one.

Give the link to the published protocol, if there is one. This may be to an external site or to a protocol deposited with CRD in pdf format.

I give permission for this file to be made publicly available

Yes

35 Dissemination plans

Give brief details of plans for communicating essential messages from the review to the appropriate audiences.

This review will be submitted to an open access, peer-reviewed journal with a track-record of publishing papers in the field of sedentary behaviour in the workplace. The review will also be submitted to a relevant conference for presentation. A report will be submitted to the funders of this review (National Institute for Health Research (NIHR)). This review will also inform further work planned by the leading researcher, as part of her NIHR Doctoral Research Fellowship, including the development and evaluation of an intervention to reduce workplace sitting time.

Do you intend to publish the review on completion?

Yes

36 Keywords

Give words or phrases that best describe the review. (One word per box, create a new box for each term)

Sedentary behaviour

Workplace

Thematic synthesis

Qualitative

Implementation

Occupational

Sitting

37 Details of any existing review of the same topic by the same authors

Give details of earlier versions of the systematic review if an update of an existing review is being registered, including full bibliographic reference if possible.

38 Current review status

□

Review status should be updated when the review is completed and when it is published.

Ongoing

39 Any additional information

Provide any further information the review team consider relevant to the registration of the review.

40 Details of final report/publication(s)

This field should be left empty until details of the completed review are available.

Give the full citation for the final report or publication of the systematic review.

Give the URL where available.

□

b: Amendments to the original PROSPERO protocol

1. Initial search strategy

An initial search was conducted (see below for details). The results were sifted by title and then by abstract. However, after cross-referencing papers in KM’s personal collection that met the inclusion criteria based on abstract, this initial search strategy was deemed not to be sensitive or specific enough, as more than 40 potentially relevant studies that were in KM’s personal collection had not been picked up. Therefore, a second search strategy was devised (as shown in Section 2.4.2 above). This revised search strategy was simplified and removed the MeSH terms and the “Barriers, levers, facilitators, mediators, moderators or factors” search terms. It was determined that the terms relating to the factors impacting on effectiveness would be better elicited from the data extraction process, as there may be contextual factors that are not highlighted by the authors as barriers or facilitators, but which may appear to be relevant e.g., type of organisation. In addition, a “NOT” search criterion was included relating to children and adolescents, as the original search had identified many papers involving children or schools which were not relevant. Filters within the databases were set to select only English language papers, with no limit to the date of publication.

Table 1: Search terms (see example, Figure 1)

| Terms | Thesaurus |
|---------------------------------|---|
| Population | Employee* OR staff OR workforce OR worker* OR occupation OR workplace* OR desk* OR office* (population and context) AND Sedentary OR sitting OR inactivity (exposure) |
| Intervention | Education OR counselling OR prompt* OR reminder* OR management support OR sit-stand OR stand* OR workstation* |
| Comparators | None |
| Outcomes (“Process evaluation”) | Barrier* OR lever* OR facilitator* OR mediator* OR moderator* OR factor |
| Study design | None |

MeSH terms to include:

- For Medline:
Human engineering; sedentary lifestyle; workplace; health behaviour; health knowledge, attitudes, practice; health education; health promotion; occupational health
- For PsycINFO:
Human factors engineering; sedentary behaviour; workplace intervention; health behaviour; health promotion; health education; occupational health
- For CINAHL:
Ergonomics; lifestyle, sedentary; work environment; health behaviour; attitude to health; health education; health promotion; motor activity; standing; occupational diseases.

Table 2: Search Limits

| | |
|----------------------------|------|
| Study designs | None |
| Publication types | None |
| Date of publication | None |

| | |
|---------------------|---------|
| Language | English |
| Other limits | None |

Sources to be searched

- Medline, PsycINFO, CINAHL, Web of Science
- Check reference lists of all relevant papers
- Search websites of relevant organisations (e.g., VicHealth) and also Google, Google Scholar and Mendeley for grey literature.

Figure 1: Example Search Strategy

In Web of Science (02/12/2016)

Search History:

| Set | Results | |
|-----|------------|---|
| | | <input type="button" value="Save History"/> <input type="button" value="Open Saved History"/> |
| # 6 | 927 | #5 AND #4 AND #3 Timespan=All years Search language=English |
| # 5 | 10,504,967 | TS=(Barrier* OR lever* OR facilitator* OR mediator* OR moderator* OR factor*) Timespan=All years Search language=English |
| # 4 | 2,406,544 | TS=(Ergonomic* OR education OR counselling OR prompt* OR reminder* OR management support OR walking meeting* OR standing meeting*) Timespan=All years Search language=English |
| # 3 | 11,378 | #2 AND #1 Timespan=All years Search language=English |
| # 2 | 176,970 | TS=(sedentary OR sitting OR physical inactivity) Timespan=All years Search language=English |
| # 1 | 1,975,456 | TS=(Employee* OR staff OR workforce OR worker* OR occupation* OR workplace* OR desk* OR office*) Timespan=All years Search language=English |

2. Quality Assessment

In the protocol, it was anticipated that that Critical Appraisal Skills Programme (CASP) checklists would be used for assessing the quality of each of the papers to be included in the review as the CASP checklist covers a wide range of study designs. However, after discussion with an expert in synthesis methods it was determined that the more appropriate method of quality assessment for this review would be to utilise the best tool available for each study type rather than one generic tool. Those tools are described in Section 2.4.6 above.

3. Data Synthesis

The qualitative data were originally planned to be synthesised using thematic analysis (as per the published protocol). However, after discussion with an expert in synthesis methods, it was subsequently decided that a “best-fit” framework synthesis, which combine both framework and thematic analysis, would be more appropriate. This analysis was determined to be more efficient as a vast amount of the data can be coded against an existing framework, but still allows for data that cannot be accommodated for within the framework to be interpreted and included as emergent themes.

Appendix 3: Study characteristics and quality assessment tables

Table 1: Study characteristics

| Author (reference) | Study design | Setting | Participants | Intervention (description, complex or simple, duration, theoretical support) | Control group | Objective or subjective measure of sitting | Reduction in Sitting Time | Effect sizes (Cohen's <i>d</i>) |
|---|---|---|--|---|--|--|--|--|
| Alkhajah et al. 2012 [88] | Non-randomised | Academic institution - health research, Australia | Total: n=32 Intervention group n=18 Control group n=14 | Sit-stand desk plus verbal and written instructions on best use (intervention duration: 3 months) - simple intervention Theory use not explicitly mentioned | Control group received no modifications | Objective (activPAL) | Pre-post for intervention group at 1 week: -137 mins/8hr workday Pre-post for intervention group at 3 months: -125 mins/8hr workday Intervention vs control at 1 week: -143 mins/8hr workday (p<0.001) Intervention vs control at 3 months: -137 mins/8hr workday (p<0.001) | 2.397 (intervention vs control at 3 months) |
| Chau et al. 2014 [59] <i>Linked paper (qualitative study):</i> Chau et al. 2014 [135] | Crossover RCT (with qualitative study embedded) | Non-government health agency, Australia | Total: n=42 | Sit-stand desk plus training on how to use and ergonomic assessment (intervention duration: 4 weeks) - simple intervention Theory use not explicitly mentioned | Control group received no modifications (remained on waitlist to receive intervention at the end of the study) | Objective (activPAL) | Pre-post intervention group: -73 mins/day (p<0.001) Intervention vs control: -83 mins/day (p=0.004) (at 4 weeks) | Unable to calculate |

| | | | | | | | | |
|---|------------------------------------|--|---|--|--|---|---|---|
| Chau et al. 2016 [117] | Non-randomised | Call centre, Australia | Total: n=31 Intervention group n=16 Control group n=15 | Sit-stand desk, brief training on use and daily email reminders to stand-up more during the first 2 weeks after installation (intervention duration: 19 weeks) - complex intervention Theory use not explicitly mentioned | Control group received no modifications | Objective (activPAL and ActiGraph) but low participant adherence so only presented subjective data (self-report) in paper (objective data was presented as supplemental info) | Subjective: Need to look at objective data Pre-post for intervention group at week 1: -64 mins/workday (p=0.049) Pre-post for intervention group at week 4: -74 mins/workday (p=0.027) Pre-post for intervention group at week 19: -100 mins/workday (p=0.009) Intervention vs control at week 1: -44 mins/workday (p=0.302) Intervention vs control at week 4: -47 mins/workday (p=0.354) Intervention vs control at week 19: -82 mins/workday (p=0.100) | 1.090 (intervention vs control at week 19) |
| De Cocker et al. 2016 [90] <i>Linked paper: (intervention development) De Cocker et al. 2015 [134]</i> | RCT (2 interventions, one control) | University and environment agency, Belgium | Total: n=213 Tailored group n=78 Generic group n=84 Control group n=51 | Web-based intervention - personalised computer-tailored advice with tips on how to reduce and interrupt sitting time (intervention duration not | Control group received no modifications (remained on waitlist to receive intervention at | Objective (activPAL) but only a sub-sample (57%) used these, the rest were subjective (self-report) | Subjective: Pre-post for tailored intervention group at 1 month: -27 mins/workday Pre-post for tailored intervention group at 3 months: -82 | 0.883 (tailored intervention vs control at 3 months using subjective data) 0.351 |

| | | | | | | | |
|--|--|--|--|---|------------------------------|--|--|
| | | | | <p>documented) - complex intervention</p> <p>Also generic intervention - non-personalised info on the importance of reducing/interrupting sitting time and tips on how to achieve this</p> <p>Theory used - theory of planned behaviour with the concept of goal-setting integrated (goal-setting and action plans operate within Self-Regulation Theory), also concepts of Self-Determination Theory</p> | <p>the end of the study)</p> | <p>mins/workday</p> <p>Pre-post for generic intervention group at 1 month: -13 mins/workday Pre-post for generic intervention group at 3 months: -20 mins/workday</p> <p>Tailored vs generic at 3 months: -62 mins/workday (p=0.002) Tailored vs control at 3 months: -102 mins/workday (p=0.002)</p> <p>Total workday sitting change from baseline to follow-up was significantly different between the 3 groups (p<0.001).</p> <p>Objective: Pre-post for tailored intervention group at 1 month: +24 mins/day Pre-post for tailored intervention group at 3 months: +31 mins/day</p> <p>Pre-post for generic intervention group at</p> | <p>(generic intervention vs control at 3 months using subjective data)</p> |
|--|--|--|--|---|------------------------------|--|--|

| | | | | | | | | |
|---|---|----------------------------------|--|--|---|---|---|---|
| | | | | | | | 1 month: -4 mins/day Pre-post for generic intervention group at 3 months: -2 mins/day Total daily sitting change from baseline to follow-up was non significantly different between the 3 groups (p=0.69). | |
| Dutta et al. 2014 [89] <i>Linked paper (qualitative study): Dutta et al. 2015</i> [136] | Crossover RCT with qualitative study embedded | Private sector organisation, USA | Total: n=29 (n=17 received intervention during period 1; n=12 during period 2) | Sit-stand desks, advice on usage, email reminders to use desks (intervention duration: 4 weeks) - complex intervention Theory use not explicitly mentioned | Control group received no modifications | Objective (accelerometer - Modular Signal Recorder) | During control period, participants spent 67% of worktime sitting During intervention period, participants spent 46% of worktime sitting This is a reduction of 21% (95% CI 18-25%) at 4 weeks | Unable to calculate |
| Evans et al. 2012 [118] | RCT | University, Scotland | Total: n=30 Education only group n=15 Point-of-choice prompts group n=15 | Education (Ed) only - education session on adverse health effects of prolonged sitting Point-of-choice (POC) prompts - as above plus prompting software reminding them to stand every 30 mins - complex intervention (intervention duration: 5 days) | Controls were the education only group | Objective (activPAL) | Pre-post for POC + Ed group: -0.3hrs/day (not statistically significant) Pre-post for Ed only group: +0.1hrs/day (not statistically significant) POC + Ed (intervention) vs Ed only (control): -0.3hrs/week (p=0.084) (at 1 week) | 0.388 (intervention vs control at 1 week) |

| | | | | | | | | |
|--------------------------------|----------------|---|--|--|--|------------------------------------|---|---|
| | | | | Theory use not explicitly mentioned | | | | |
| Gao et al. 2016 [65] | Non-randomised | University, unclear which country, possibly Finland | Total: n=92 | Sit-stand desks (intervention duration: 6 months) - simple intervention BUT intervention participants also moved into a new building, so may have contributed to changes seen Theory use not explicitly mentioned | Control group received no modifications | Subjective (self-report) | Pre-post for intervention group: - 6.6% of worktime Intervention vs control at 6 months: - 11.6% of worktime (p=0.019) | 0.638 (intervention vs control at 6 months) |
| Gordon 2013 [68] | RCT | University, USA | Total: n=24 Intervention group n=13 Control group n=11 | Emails with psychosocial info and other available resources relating to decreasing SB at work (educational info, goal-setting, self-regulation, facilitation, reciprocal determinism (intervention duration: 10 weeks) - complex intervention All participants received walking workstation (intervention and control) Theory used - social cognitive theory | Control group received general health education - biweekly emails concerning general health topics frequently addressed in the workplace - educational materials were drawn from authoritative sources pertaining to that week's topic | Objective (activPAL and ActiGraph) | Pre-post for intervention group: - 14.7 mins/workday Intervention vs control: -5.5 mins/workday (p=0.06) at 10 weeks | 0.102 (intervention vs control at 10 weeks) |

| | | | | | | | | |
|---|--------------------|------------------------------|--|--|---|--|--|---|
| Graves et al. 2015 [119] | Parallel-group RCT | University, England | Total: n=44 Intervention group n=23 Control group n=21 | Sit-stand desks, advice on usage (intervention duration: 8 weeks) - simple intervention Theory use not explicitly mentioned | Control group received no modifications | Subjective (ecological momentary assessment - EMA) | Pre-post for intervention at 4 weeks: -86.7 mins/8hr workday Pre-post for intervention at 8 weeks: -63.9 mins/8hr workday Intervention vs control at 4 weeks = -87.2 mins/8hr workday (95% CI -136.8 to -38.3 – statistically significant p<0.05) Intervention vs control at 8 weeks = -80.2 mins/8hr workday (95% CI -129.0 to -31.4 - statistically significant p<0.05) | 1.542 (intervention vs control at 8 weeks) |
| Healy et al. 2013 [62] <i>Linked paper (additional quantitative findings): Stephens et al. 2014</i> [138] | Non-randomised | Government agency, Australia | Total: n=43 Intervention group n=22 Control group n=21 | Multicomponent intervention - organisational element (organisational strategies to sit less, liaison person in organisation), environmental element (sit-stand desks), individual element (health coaches with feedback) (intervention duration: approx. 4 weeks) - complex intervention | Control group received no modifications | Objective (activPAL) | Pre-post for intervention group: -121.8 mins/8hr workday (statistically significant) Intervention vs control: -125.2 mins/8hr workday (p<0.001) (at 4 weeks) | 2.770 (intervention vs control at 4 weeks) |

| | | | | | | | | |
|--|-------------|------------------------------|--|--|--|----------------------|--|--|
| | | | | Theory use not explicitly mentioned (although likely based on social cognitive theory and socio-ecological theory as per was a pilot for the study below) | | | | |
| <p>Healy et al. 2016 [120]</p> <p><i>Linked papers: (protocol)</i> Dunstan et al. 2013 [133]</p> <p><i>(intervention development)</i> Neuhaus et al. 2014 [87]</p> <p><i>(pilot testing)</i> Healy et al. 2013 [62] and Neuhaus et al. 2014 [61]</p> <p><i>(description paper)</i> Healy et al. 2016 [139]</p> | Cluster RCT | Government agency, Australia | Total: n=231 Intervention group n=136 Control group n=95 | <p>Multicomponent intervention - organisational element (organisational strategies to sit less, liaison person in organisation), environmental element (sit-stand desks), individual element (health coaches with feedback) (intervention duration: 12 months) - complex intervention</p> <p>Theory used - social cognitive theory and socio-ecological theory</p> | Control group maintained usual practice but received written feedback on their activity and biomarker outcomes at 3-months (baseline and 3-month results provided) and 12-months | Objective (activPAL) | <p>Pre-post for intervention group at 3 months: -107.8 mins/8hr workday (statistically significant) Pre-post for intervention group at 12 months: -58.3 mins/8hr workday (statistically significant)</p> <p>Intervention vs control at 3 months: -99.1 mins/8hr workday (p<0.001) Intervention vs control at 12 months: -45.4 mins/8hr workday (p<0.001)</p> | 0.990 (intervention vs control at 12 months) |
| Neuhaus et al. 2014 [61] | Quasi-RCT | University, Australia | Total: n=44 Multicomponent intervention n=16 Workstation | Multicomponent intervention - organisational elements (management support), environmental elements (sit-stand | Control group received no modifications | Objective (activPAL) | <p>Pre-post for multicomponent group: -94 mins/8hr workday (p=0.002) (at 3 months) Pre-post for workstation only</p> | 1.689 (multicomponent intervention vs control at 3 months) |

| | | | | | | | | |
|--------------------------------|----------------|--------------------------------------|--|---|---|---|---|---|
| | | | only n=14 Control group n=14 | desks), individual elements (face-to-face coaching, feedback and goal-setting) - complex intervention Workstation only group too - simple intervention (intervention duration: 3 months) Theory used - social cognitive theory and socio-ecological theory | | | group: -52 mins/8hr workday (p=0.001) (at 3 months) Multicomponent vs control: -89 mins/8hr workday (p<0.001) (at 3 months) Workstation only vs control: -33 mins/8hr workday (p=0.285) (at 3 months) Multicomponent vs workstation only: -56 mins/8hr workday (p=0.033) (at 3 months) | 0.860 (workstation only intervention vs control at 3 months) |
| Pronk et al. 2012 [121] | Non-randomised | Non-profit, health organisation, USA | Total: n=34 Intervention group n=24 Control group n=10 | Sit-stand desks as part of a comprehensive and multicomponent general health and wellbeing programme (intervention duration: 4 weeks) - simple intervention Theory use not explicitly mentioned | Control group received general health and wellbeing intervention but no sit-stand desks | Subjective (experience-sampling methodology) NB: Not used ESM score as don't give a comparable measure of sitting time | Pre-post at week 5: -66 mins/workday (p=0.03) Pre-post at week 7: +8 mins/workday (p=0.57) Intervention vs control at week 5: -83 mins/workday (statistical significance not calculated) Intervention vs control at week 7: +30 mins/workday (statistical significance not calculated) | Unable to calculate |

| | | | | | | | | |
|---|---|---|---|---|---|--------------------------|--|--|
| Puig-Ribera et al. 2015 [122] | Quasi-RCT | 4 x universities, Spain | Total: n=264 Intervention group n=129 Control group n=135 | Automated web-based program with range of ecological support strategies to facilitate decrease in sitting time (intervention duration: 19 weeks) - complex intervention Ramping phase - first 8 weeks; maintenance phase - 9-19 weeks; follow-up - 2 months after completion Theory use not explicitly mentioned, did report "ecological support" | Control group received no modifications | Subjective (self-report) | Pre-post from baseline to ramping phase: -20.6 mins/day (p=0.004) Pre-post from baseline to maintenance phase: -23.5 mins/day (p=0.04) Pre-post from baseline to follow-up phase: -32.2 mins/day (p=0.007) Intervention vs control - overall group differences: p<0.001 | 0.142 (intervention vs control at 19 weeks) |
| Tobin et al. 2016 [91] <i>Linked paper (qualitative study): Leavy et al. 2016</i> [137] | RCT (with associated qualitative study) | A non-government organisation (possibly in private sector, but unclear) and a university, Australia | Total: n=37 Intervention group n=18 Control group n=19 | Sit-stand desks plus info on usage and brief educational intervention (intervention duration: 4 weeks) - complex intervention Theory use not explicitly mentioned | Control group received no modifications | Objective (activPAL) | Pre-post intervention group: -99.8 mins/8hr workday (21% of time spent at work) Intervention vs control: -100.6 mins/8hr workday (p<0.001) (at 4 weeks) | 1.950 (intervention vs control at 4 weeks) |
| Urda et al. 2016 [123] | RCT | University, USA | Total: n=44 Intervention group n=22 Control group n=22 | Intervention: alert every hour to disrupt sitting, set in university scheduling system; also received handouts with ideas for light PA whilst at work and educational info | Control group received no modifications | Objective (activPAL) | Pre-post average sit time: -0.12 hrs/workday (p=0.294) Intervention vs control average sit time: -0.15 | 0.129 (intervention vs control at 1 week) |

| | | | | | | | | |
|---|---|--|--|--|---|----------------------|--|---|
| | | | | (intervention duration: 1 week) - complex intervention Theory use not explicitly mentioned | | | hrs/workday (p=0.012) at 1 week | |
| Brakenridge et al. 2016 [124] <i>Linked paper (protocol): Brakenridge et al. 2016</i> [132] | Cluster RCT (2 interventions, no control) | Private sector organisation, Australia | Total: n=153 Group ORG n=87 Group ORG + tracker n=66 | Organisational support “Group ORG” - complex intervention including leaflets, emails, workplace champions, management support Group ORG + tracker - as above but with LUMOback device (belt that syncs with mobile app) which provides feedback on sitting time and activity (intervention duration: 12 months) Mention of socio-ecological model, but not confirmed that this was used in intervention development | Other intervention group (“Group ORG”) used as a comparator | Objective (activPAL) | Pre-post for Group ORG at 3 months: -3.8 mins/10hr workday (p=0.588) Pre-post for Group ORG at 12 months: -40.5 mins/10hr workday (p<0.001) Pre-post for Group ORG + tracker at 3 months: -10.7 mins/10hr workday (p=0.194) Pre-post for Group ORG + tracker at 12 months: -35.5 mins/10hr workday (p=0.006) Group ORG + tracker vs Group ORG at 3 months: -6.6 mins/10hr workday (p=0.645) Group ORG + tracker vs Group ORG at 12 months: +4.4 mins/10hr workday (p=0.818) | 0.117 (Group ORG + tracker vs Group ORG at 12 months) |

| | | | | | | | | |
|---------------------------------|-------------|---|---|--|---|-----------------------|---|--|
| Danquah et al. 2016 [92] | Cluster RCT | 3 public sector and 1 private sector organisations, Denmark and Greenland | Total: n=317 Intervention group n=173 Control group n=144 | <p>Multicomponent intervention - local ambassadors/champions, management support, high meeting tables, routes for walking, educational lecture, workshop (strategies to reduce sitting developed), emails/text message reminders (intervention duration not documented) - complex intervention</p> <p>Sit-stand desks are standard in Denmark/Greenland, so all participants (intervention and control) had sit-stand desks.</p> <p>Theory used - social cognitive theory, Rogers' diffusion on innovations theory and goal-setting theory</p> | Other intervention group (with sit-stand desks provided as standard) used as comparator | Objective (ActiGraph) | <p>Pre-post for multi-component intervention group at 1 month: -53 mins/8hr workday Pre-post for multi-component intervention group at 3 months: -35 mins/8hr workday</p> <p>Multi-component intervention vs sit-stand desks only at 1 month: -71 mins/8hr workday (p<0.001) Multi-component intervention vs sit-stand desks only at 3 months: -48 mins/8hr workday (p<0.001)</p> | 0.845 (multi-component intervention vs sit-stand desks only at 3 months) |
| Donath et al. 2015 [125] | RCT | Private sector health insurance company, Switzerland | Total: n=31 Intervention group n=15 Control group n=16 | Intervention group received sit-stand desks and also received pop-up messages to promote standing time (intervention duration: 12 weeks) - simple intervention | Other intervention group (with sit-stand desks provided as standard) used as comparator | Objective (ActiGraph) | <p>Pre-post for sit-stand desks + prompt intervention group: -1.6hrs/week</p> <p>Sit-stand desks + prompt intervention vs sit-stand desk only at 3 months: -</p> | 0.166 (sit-stand desks + prompt intervention vs sit-stand desk only at 3 months) |

| | | | | | | | | |
|---------------------------------|--------------------|--------------------------------|---|---|--|-------------------------|---|---|
| | | | | Theory use not explicitly mentioned | | | 1.4hrs/week Total weekly sitting change from baseline to follow-up was not significantly different between the 2 groups (p=0.63). | |
| Gilson et al. 2016 [85] | Non-randomised | Tele-communications, Australia | Total: n=57 Intervention group 1 n=33 Intervention group 2 n=24 | Intervention 1: Co-produced intervention with a range of strategies to sit less - complex intervention Intervention 2: as above plus real-time feedback and prompts to sit less - complex intervention (intervention duration: 5 months) Theory use not explicitly mentioned | Other intervention group ("intervention 1") used as comparator | Objective (sitting pad) | Pre-post for intervention 1: +10 mins/workday (statistical significance not reported for this measure) Pre-post for intervention 2: -13 mins/workday (statistical significance not reported for this measure) Intervention 2 vs intervention 1: -23 mins/workday (statistical significance not reported for this measure) (at 5 months) | 0.312 (intervention 2 vs intervention 1 at 5 months) |
| Swartz et al. 2014 [126] | Parallel-group RCT | University, USA | Total: n=68 Stand group n=38 Step group n=30 | Wrist-worn prompt to disrupt 60 continuous minutes of SB Stand group - get up from their chairs when prompt went off Step group - do 100 | Other intervention group ("Step group") used as comparator | Objective (activPAL) | Pre-post for Stand group: -25 mins/workday (p=0.009) Pre-post for Step group: -10.9 mins/workday (p=0.16) | 1.149 (Stand group vs Step group at 1 week) |

| | | | | | | | | |
|---|--|--|-------------|---|------------------|---------------------------------|---|---|
| | | | | steps when prompted (intervention duration: unclear, possibly 1 week) Simple intervention Theory use not explicitly mentioned | | | Stand group vs Step group: -14.1 mins/workday (not statistically significant) at 1 week | |
| Gilson et al. 2012 [127] | Pre-post intervention | Open plan office, unclear what type of organisation, Australia | Total: n=11 | Sit-stand desks, educational brief re. benefits of reducing sitting time (intervention duration: 1 week) - complex intervention Theory use not explicitly mentioned | No control group | Objective (wrist accelerometer) | Pre-1 week post: -0.1% of worktime (not statistically significant) | 0.008 (pre- vs 1 week post-intervention) |
| Gorman et al. 2013 [128] <i>Linked paper (dissertation report): Gorman 2012</i> [140] | Pre-post intervention - natural experiment | Academic physical activity research centre Canada | Total: n=24 | Intervention: Move to purpose-built office space (specifically designed by research group) activity permissive physical environment (included sit-stand desks) (intervention duration: 3 months) - complex intervention but single level of influence (environmental only) Theory use not explicitly mentioned | No control group | Objective (activPAL) | Pre-post move: -19.7 mins/8hr workday (95% CI: -42.1 to 2.8 mins) (not statistically significant) | 0.432 (pre- vs 3-month post-intervention) |
| Grunseit et al. 2013 [66] | Mixed methods - pre-post in | Government organisation, Australia | Total: n=18 | Sit-stand desks (permanent intervention, but post | No control group | Subjective (self-report) | Pre-3 months post: -1.7 hours/day (95% CI: 14 minutes to 3.2 | 1.084 |

| | | | | | | | | |
|-----------------------------------|---------------------------------------|--|-------------|---|------------------|------------------------------------|---|--|
| | natural setting + qualitative study | | | measures done after 92 days) - simple intervention Theory use not explicitly mentioned | | | hours) (or 23% of time spent sitting at work (p=0.011)) | (pre- vs 3 months post-intervention) |
| Jancey et al. 2016 [129] | Pre-post intervention - natural study | Possibly a private sector business organisation but unclear, Australia | Total: n=42 | Intervention: move to a purpose-built building that was activity-permissive (permanent intervention, but post measures done at 4 months) - single level intervention (environmental) but complex given nature of a building move Theory use not explicitly mentioned | No control group | Objective (ActiGraph) | Pre-4 months post: -19.6 mins/workday (p=0.001) | 1.064 (pre- vs 4 months post-intervention) |
| Mackenzie et al. 2015 [64] | Pre-post intervention | Health-related research university, England | Total: n=26 | Multicomponent intervention with management support, prompts, educational element, use of social media (co-produced intervention) (intervention duration: 4 weeks) - complex intervention Theory used - socio-ecological model | No control group | Subjective (self-report) | Pre-4 weeks post: -26 mins/workday (not statistically significant) | 0.302 (pre- vs 4 weeks post-intervention) |
| Mansoubi et al. 2016 [67] | Pre-post intervention | University, England | Total: n=40 | Sit-stand desks plus educational element plus online planning tool for comfortable computing (intervention duration: | No control group | Objective (activPAL and ActiGraph) | Pre-post at 1 week: -45 mins/workday (p<0.01) Pre-post at 6 weeks: -40 mins/workday (not statistically | 0.376 (pre- vs 3 months post-intervention) |

| | | | | | | | | |
|-------------------------------|---------------------------|---|---|--|----------------------------|-----------------------|--|---------------------|
| | | | | 3 months) - complex intervention Theory use not explicitly mentioned | | | significant) Pre-post at 3 months: -33 mins/workday (not statistically significant) | |
| Parry et al. 2013 [86] | Parallel-arms cluster RCT | 3 x Government organisations, Australia | Total: n=133 Intervention A n=49 Intervention B n=30 Intervention C n=54 | Intervention A: active office work (daily access to sit-stand desks, plus other suggestions for staff to be actively working) Intervention B: traditional PA (pedometer challenge, active transport, active work, lunchtime walks) Intervention C: office ergonomics (active sitting, standing meetings, use of piano stool / air cushion) (intervention duration 12 weeks) NB some of the intervention elements were common to different groups All complex interventions Theory use not explicitly mentioned | No "no intervention" group | Objective (ActiGraph) | Pre-post for all interventions combined: -1.71% sedentary time during work hours (reduction of 8 mins/workday) Pre-post for intervention A: -3.09% (95% CI -5.82, -0.35) adjusted pre- to post-intervention change for sedentary time in work hours Pre-post for intervention B: -0.57% (95% CI -3.54, 2.40) adjusted pre- to post-intervention change for sedentary time in work hours Pre-post for intervention C: -1.37% (95% CI -2.86, -0.13) adjusted pre- to post-intervention change for sedentary time in work hours Intervention A vs intervention B: -2.52% (p=0.248) sedentary time in work hours at 12 | Unable to calculate |

| | | | | | | | | |
|-------------------------------------|-----|---|---|--|----------------------------------|-----------------------------|--|--|
| | | | | | | | weeks Intervention A vs intervention C: - 1.72% (p=0.289) sedentary time in work hours at 12 weeks | |
| Priebe et al. 2015 [130] | RCT | Private sector organisation, unclear which country possibly Canada | Total: n=99 HP/HC group n=23 HP/LC group n=24 LP/HC group n=25 LP/LC group n=27 | Email messages - received 1 of 4 different types: - high personal/high contextual (HP/HC) - high personal/low contextual (HP/LC) - low personal/high contextual (LP/HC) - low personal/low contextual (LP/LC) Complex intervention - only email message but personalised and contextualised One email and follow- up immediately and 3 work days after (intervention duration: 1 day) Theory used - focus theory (descriptive norms) | No "no intervention" group | Subjective (self-report) | Pre-post for HP/HC group: -34.13 mins/workday (excluding lunch hour) Pre-post for HP/LC group: -45.90 mins/workday (excluding lunch hour) Pre-post for LP/HC group: -69.50 mins/workday (excluding lunch hour) Pre-post for LP/LC group: -47.97 mins/workday (excluding lunch hour) No significant differences for personal (p=0.149) or contextual (p=0.500) similarity were found. For all groups together, at time 1 = | For HP/HC group: 0.369 (pre- vs post- intervention) For HP/LC group: 0.369 (pre- vs post- intervention) For LP/HC group: 0.577 (pre- vs post- intervention) For LP/LC group: 0.479 (pre- vs post- intervention) |

| | | | | | | | | |
|---|-----------------------|-------------------|-------------|---|------------------|--------------------------|--|---|
| | | | | | | | 180.00; at time 3 = 130.68 ($p < 0.001$) | |
| Richards and Brain 2015 [131] | Pre-post intervention | University, Wales | Total: n=18 | Multicomponent intervention - began with a one-day event (On your feet Britain (OYFB)), then 30-minute presentation identifying strategies to reduce sitting, email reminders daily, OYFB posters/leaflets (intervention duration: 10 days) - complex intervention Theory used – Behaviour Change Wheel, Theoretical Domains Framework, COM-B model, Theory of Planned behaviour | No control group | Subjective (self-report) | Pre-10 days post: median reduction in sitting time was 10% | 0.848 (pre- vs 10 days post-intervention) |

Table 2: Summary quality assessment of RCTs (Cochrane Risk of Bias Tool)

| Author (reference) | Random sequence generation | Allocation concealment | Blinding of participants and personnel | Blinding of outcome assessment | Incomplete outcome data | Selective reporting | Other sources of bias | Overall assessment |
|---------------------------|----------------------------|------------------------|--|--------------------------------|-------------------------|---------------------|-----------------------|--------------------|
| Brackenridge et al. [124] | + | ? | X | ? | + | + | ? | X |
| Chau et al. [59] | + | ? | X | ? | + | X | ? | X |
| Danquah et al. [92] | + | ? | X | + | + | ? | ? | X |
| De Cocker et al. [90] | ? | + | X | ? | ? | ? | X | X |
| Donath et al. [125] | + | ? | X | ? | ? | ? | ? | X |
| Dutta et al. [89] | + | ? | X | ? | + | ? | ? | X |
| Evans et al. [118] | + | + | X | + | + | ? | + | X |
| Graves et al. [119] | + | + | X | X | + | ? | X | X |
| Healy et al. [120] | + | ? | X | X | + | X | + | X |
| Neuhaus et al. [61] | ? | + | X | X | ? | ? | X | X |
| Parry et al. [86] | + | ? | X | X | X | ? | ? | X |
| Puig-Ribera et al. [122] | ? | + | X | ? | + | ? | X | X |
| Swartz et al. [126] | + | ? | X | ? | ? | ? | ? | X |
| Urda et al. [123] | + | + | X | X | ? | ? | ? | X |
| Priebe et al. [130] | + | + | X | ? | ? | ? | X | X |
| Gordon [68] | ? | ? | X | ? | + | ? | + | X |
| Tobin et al. [91] | ? | ? | X | ? | ? | ? | ? | X |

+, low-risk of bias; X, high-risk of bias;?, unclear-risk of bias

Table 3: Summary quality assessment of non-randomised trials (Risk of Bias in Non-Randomised Studies-of Interventions)

| Author (reference) | Confounding | Selection of participants | Classification of interventions | Deviations from intended interventions | Missing data | Measurement outcomes | Selection of reported results | Overall assessment |
|----------------------|-------------|---------------------------|---------------------------------|--|--------------|----------------------|-------------------------------|--------------------|
| Alkhajah et al. [88] | - | + | + | + | - | - | - | - |
| Chau et al. [117] | - | + | + | + | - | X | X | X |
| Gao et al. [65] | X | + | + | NI | NI | X | X | X |
| Gilson et al. [85] | X | - | + | NI | NI | - | - | X |
| Healy et al. [62] | - | + | + | NI | - | - | - | NI |
| Pronk et al. [121] | X | + | NI | NI | NI | X | X | X |

+, low-risk of bias; -, moderate-risk of bias; X, serious-risk of bias; NI, no information provided

Table 4: Summary quality assessment of mixed methods studies (Mixed Methods Appraisal Tool)

| Author | Qualitative | | | | Quantitative | | | Mixed methods | | | |
|----------------------|-----------------------------|---------------------------|--------------------|---------------------------------|----------------------|-----------------------|----------------------|----------------------|-----------------|-------------------------|------------------------|
| | Sources of data appropriate | Data analysis appropriate | Considered context | Researcher influence considered | Sampling appropriate | Sample representative | Measures appropriate | Response rate (≥60%) | Relevant design | Integration appropriate | Limitations considered |
| Grunseit et al. [66] | Y | Y | N | ? | ? | N | N | N | Y | Y | ? |

Y, Yes; N, No; ?, can't tell

Overall score for Grunseit et al.: 0% (2/4 for qualitative component, 0/4 for quantitative component, 2/3 for mixed methods component)

Table 5: Summary quality assessment of qualitative studies (CASP Tool for Qualitative Studies)

| Author (reference) | Clear aim | Appropriate methods | Appropriate study design | Recruitment appropriate | Data collection appropriate | Researcher-participant relationship considered | Ethical issues considered | Data analysis rigorous | Clear statement of findings | Research valuable |
|---------------------|-----------|---------------------|--------------------------|-------------------------|-----------------------------|--|---------------------------|------------------------|-----------------------------|-------------------|
| Chau et al. [135] | Y | Y | Y | Y | Y | ? | Y | Y | Y | Y |
| Dutta et al. [136]* | N | ? | NA | NA | NA | NA | NA | NA | NA | NA |
| Leavy et al. [137] | Y | Y | Y | Y | Y | ? | Y | Y | ? | Y |

Y, Yes; N, No; ?, can't tell; NA, not applicable

*Dutta et al. failed the initial screening questions, so no further quality assessment was conducted, instead it was automatically deemed to have a high-risk of bias

Appendix 4

a: Phase 1 recruitment email and participant information sheet

Recruitment email

Subject: Sit Less at Work Research Project - Volunteers Needed

Dear [organisation name] staff,

Do you sit at your desk all day?

Are you interested in giving your views on prolonged sitting at work?

My name is Kelly and I have been given permission by your organisation to carry out an exciting new research project looking at ways of reducing your sitting time at work.

Why is this important?

As you may have heard in the news recently, sitting for long periods puts you at a higher risk of a range of health problems such as neck/back pain, heart disease and diabetes. Finding ways to break-up and reduce your sitting time is therefore really important.

What is involved?

As part of Phase 1 of this research project, I am looking for desk-based volunteers to get involved in a short (max. 60 mins) group discussion to hear your thoughts on what may help and hinder you from sitting less at work. I want to hear a range of views on this issue – from those of you who are active and those who are not, and from all staff grades. I aim to hold at least two separate discussions, one with staff and one with managers.

The group discussion will take place at a convenient location within your workplace at a date and time that suits the majority of volunteers.

What next?

I have attached an Information Leaflet which provides much more detail, so please take a couple of minutes to have a read through that. Feel free to get in touch either via email or phone if you have any questions or queries (my contact details are at the end of the Information Leaflet).

If you would like to participate, please reply to me (kelly.mackenzie@sheffield.ac.uk) by [time] on [date], after which I will arrange a suitable time/date for the group discussion.

Many thanks for your time.

Best wishes,

Kelly

Dr Kelly Mackenzie (GMC No: 6163374)
NIHR Public Health Fellow / Specialty Registrar in Public Health / Honorary Clinical Lecturer
School of Health and Related Research

University of Sheffield
Regent Court
Sheffield
S1 4DA

Mob: 07740 786072
Email: kelly.mackenzie@sheffield.ac.uk
@kellymackenzie1

Sit Less at Work Phase 1 Participant Information Sheet

You are being invited to take part in a research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. If you would like to arrange a meeting with the lead researcher, please find her contact details at the end of this information sheet. Alternatively, feel free to contact her with any questions you may have or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

1. Research project title

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations

2. What is the project's purpose?

Background

Sitting for long periods is linked to higher risks of health problems such as heart disease, diabetes, obesity, depression, neck/back problems, and early death. This link between sitting and poor health is present even for people who take part in regular exercise, if they spend the rest of their day sitting. Therefore, replacing some sitting time with light activities, such as standing and walking, could be an important way to improve health.

Workplace sitting is a particular issue when thinking about how to reduce the total amount of sitting time. This is because of the increase in desk-based jobs where workers sit for an average of six-hours a day. Therefore, there is a need to develop, test and review the practicality of changes in the workplace aimed at reducing time spent sitting. To encourage employers to support such changes, they must be low-cost and not negatively impact workers' productivity.

Aims

The overall aim of this study is to develop, test and review how practical a low-cost package of changes is at reducing sitting time within different types of workplaces.

This study is being split into three phases:

- Phase 1 aims to explore the specific issues in the workplace that cause you to sit for long periods
- Phase 2 aims to develop a low-cost package of changes with a group of staff members to ensure it is tailored to the specific issues in your workplace
- Phase 3 aims to test out the package of changes and to see if it results in a decrease in sitting time at work.

It is Phase 1 of the study that you are being invited to participate in at this stage.

3. Why have I been chosen?

You have been chosen as your organisation has identified your job role as one that requires you to sit at a desk for long periods of time whilst at work.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part in the study. Your organisation has been informed that they should not put any pressure on you to participate. If you do agree to participate, you should know that you can withdraw from the study at any time, without having to give a reason. However, any data collected up to that point will be kept by the research team.

5. What will happen to me if I take part?

As part of Phase 1 of this study, you will be required to participate in a discussion with a group of up to 8 of your colleagues, which will last approximately 1 hour. This discussion will occur within your workplace and at a time that is most convenient for you and your colleagues. Your organisation has agreed to allow you to participate in this discussion as part of your work time and you will not be financially penalised for taking part. The issues that will be discussed will relate to how easy or difficult you may find it to reduce the time you spend sitting at work and the reasons for these views. Prior to the discussion, you will also be asked to complete a brief questionnaire, which will provide the research team with some background information including your age, gender, ethnicity, job title or job role.

By agreeing to participate in Phase 1 of this study, you are not agreeing to participate in Phases 2 and 3 of this study and there will be no obligation for you to do so.

6. Will I be recorded, and how will the recorded material be used?

The discussion will be audio-recorded so that the research team obtain an accurate reflection of the points you and your colleagues raise. These recordings will then be typed up word-for-word, but at this stage, no names will be used, instead a random letter and number will replace your name, so the points you raise will be anonymous. The audio recording of the discussion will be used only for analysis and written quotes will be used for illustration of the findings in conference presentations, lectures, written reports and academic publications. No other use will be made of them without your written permission, and no one outside the project will be allowed access to the original recordings.

7. What do I have to do?

If you agree to take part, the lead researcher will provide a list of potential times and dates for the discussion to be held and you will need to let the lead researcher know the most convenient time for you. You will then need to attend the meeting and be prepared to discuss your views about prolonged sitting in the workplace and how to reduce it.

8. What are the possible disadvantages and risks of taking part?

As the discussions will be taking place during your working day, it is likely that your colleagues or line manager will be aware that you are taking part in the study, so if this is of a concern to you please get in contact with the lead researcher. Also, you will need to give up an hour of your working time to be part of this study, although this will be at a time convenient to the majority of the volunteers. This has been agreed by your organisation, so you do not need to seek specific permissions to participate, although you may wish to let your line manager know that you are planning to participate.

As part of the discussions, you or a colleague may want to bring up some difficult subjects relating to your experiences in the workplace. These issues will not be specifically asked about, but you or your colleagues may feel the need to raise them. These may relate to difficult relationships in the workplace or indeed workplace bullying. If these issues are brought up, the lead researcher will signpost you or your colleagues to appropriate support. There are no foreseen physical risks to participating in this research.

9. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in the project, this initial phase of the research project aims to understand what the barriers may be within your workplace to reducing sitting time. This information will then be used to help develop a package of changes tailored to your workplace to reduce sitting time. Reducing workplace sitting time is important for your health and may also help improve concentration-levels and how effectively you work.

10. What happens if the research study stops earlier than expected?

If this is required, the reason(s) will be clearly explained to you.

11. What if I am unhappy about something?

If you wish to make a complaint about the way the research project is being conducted, then you should raise this in the first instance with the project supervisor (contact details at the end of this leaflet). If you feel that your complaint has not been handled satisfactorily you can contact Professor John Brazier, Dean of the School of Health and Related Research at the University of Sheffield on 0114 2220726 or via email: j.e.brazier@sheffield.ac.uk who will address any further concerns you may have.

12. Will my taking part in this project be kept confidential?

As mentioned previously, given that the discussion is planned to be held within your workplace, it is likely that your colleagues or line manager will be aware that you are taking part in the study. However, all the information that is collected about and from you during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications.

13. What will happen to the results of the research project?

The results from this phase will be used to inform future phases of this research project. Data collected during this phase may also be used for subsequent research projects if appropriate.

It is planned that the results from this phase will be published in an academic journal and possibly presented at academic conferences. At the end of the overall research project, a summary of the results from all three phases will be included in a report for your organisation and a copy will also be made available to everyone who participated in any phase of the study. You will not be able to be identified in any reports or publications.

14. Who is organising and funding the research?

The National Institute for Health Research (NIHR) is funding this research as part of the lead researcher's training fellowship and PhD project.

15. Who has ethically reviewed the project?

The School of Health and Related Research Ethics Committee has ethically reviewed and approved Phase 1 of this research project.

For further information, please contact:

Lead researcher:

Kelly Mackenzie, 07740786072, kelly.mackenzie@sheffield.ac.uk

Project Supervisor:

Elizabeth Goyder, 0114 2220783, e.goyder@sheffield.ac.uk

Prior to taking part in the study, you will receive a printed copy of this information sheet and a copy of the consent form to keep for your records.

Thank you very much for agreeing to take part in Phase 1 of this research study.

b: Phase 1 consent form

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations (Phase 1)

Name of Researcher: Kelly Mackenzie

Participant Identification Number for this project:

Please initial box

1. I confirm that I have read and understand the information sheet dated 21st March 2017 explaining Phase 1 of the above research project and I have had the opportunity to ask questions about the project.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. However, any data collected up to that point will be kept by the research team. In addition, should I not wish to answer any particular question or questions, I am free to decline. To withdraw, please contact Kelly Mackenzie on 07740786072.
3. Although I realise that it may be difficult to mask from my colleagues/line manager that I am participating in this study, I understand that my responses will be kept strictly confidential.
4. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.
5. I agree for the data collected from me to be used in future research.
6. I agree to take part in Phase 1 of the above research project.

Name of Participant

Date

Signature

Lead Researcher

Date

Signature

To be signed and dated in presence of the participant

Copies:

Once this has been signed by all parties, the participant should receive a copy of the signed and dated participant consent form, the information sheet and any other written information provided to the participants. A copy of the signed and dated consent form should be placed in the project's main record (e.g., a site file), which must be kept in a secure location.

c: Phase 1 and 2 ethics application



Application 012219

Section A: Applicant details

Created:

Fri 2 December 2016 at 10:24

First name:

Kelly

Last name:

Mackenzie

Email:

kjmackenzie1@sheffield.ac.uk

Programme name:

Health and Related Research (PhD/Health & Related Res FT) - HARR31

Module name:

N/A

Last updated:

11/01/2017

Department:

School of Health and Related Research

Date application started:

Fri 2 December 2016 at 10:24

Applying as:

Postgraduate research

Research project title:

Feasibility of a low-cost, co-produced complex intervention to reduce workplace sitting time in different workplace settings

Section B: Basic information

1. Supervisor(s)

Name

Email

Elizabeth Goyder

e.goyder@sheffield.ac.uk

2: Proposed project duration

Proposed start date:
Wed 1 February 2017

Proposed end date:
Mon 30 September 2019

3: URMS number (where applicable)

URMS number
R/146782-11-1

4: Suitability

Takes place outside UK?
No

Involves NHS?
No

Healthcare research?
No

ESRC funded?
No

Involves adults who lack the capacity to consent?
No

Led by another UK institution?
No

Involves human tissue?
No

Clinical trial?
No

Social care research?
No

5: Vulnerabilities

Involves potentially vulnerable participants?
Yes

Involves potentially highly sensitive topics?
No

1. Aims & Objectives

The overall aim of this PhD project is to develop, implement and evaluate the feasibility of a low-cost, co-produced complex intervention to reduce sitting time in a range of workplace settings.

However, this ethics application relates only to the initial two phases of this research project. The aims of these phases are:

- To explore the barriers and facilitators to reducing workplace sitting time in desk-based staff and line managers in four different organisations.
- To develop bespoke, low-cost interventions aimed at reducing workplace sitting time using co-production techniques in four different organisations.

2. Methodology

There will be four different participating organisations involved in this research project including: a local council, a large private company, a charity, and a small business. This variety will increase the generalisability of this findings. As part of the initial discussions with the employing organisations regarding the commitments involved in the research study, it will be made clear that potential participants should not be financially (or otherwise) penalised for being involved in the study during working hours, so that those who want to be involved in the various stages of the study are able to do so. Equally, it will be highlighted that employees should be free to decide whether or not they would like to participate and there should be no pressure placed on the employees to participate.

Phase 1: A qualitative study

Participants at each organisation will be recruited to focus groups to explore their thoughts regarding barriers and facilitators to reducing workplace sitting time. Two focus groups (one with line managers and one with other employees), lasting approximately 1 hour each, will be conducted at each of the four organisations. Focus groups will be facilitated by the lead researcher (KM) using a topic guide developed using the COM-B behaviour change model and ensuring a range of organisational, environmental and individual factors are discussed. A baseline questionnaire will be also completed by participants providing some basic demographic/background details (postcode, age, gender, ethnicity, educational attainment, job title, summary of job role, work-time equivalent). Focus groups will take place at a time and place most convenient for the participants.

In addition to the focus groups, key organisational factors such as the presence and content of any health and wellbeing strategies to ensure the context of the study is explored will be collected from managers and/or organisational documents.

The focus group discussions will explore four key dimensions:

1. General perceptions about workplace sitting including its benefits and possible detrimental effects
2. Current barriers to reducing sitting time in the workplace
3. Current levers to reducing sitting time in the workplace
4. Possible changes that could be implemented within the workplace to support the reduction in sitting time.

The focus group sessions will be audio-recorded, but there will also be a note-taker present to capture the key points, and non-verbal communications. Recordings will then be transcribed

verbatim and the transcripts coded into raw data themes using deductive and purposeful qualitative content analysis, then analysed using pre-determined themes based on the COM-B model and four key dimensions above. Trustworthiness will be assured through the use of: direct quotations from participants to corroborate findings; an audit trail logging all activities; and self-reflection techniques. The findings from each organisation's employee and management focus groups will aim to find common themes in order to bring together the views of the two groups (particularly if they are very different), which will support Phase 2 of the study.

Phase 2: Intervention development

The development of the interventions will be based on: findings from a review of the literature, which the lead researcher (KM) is currently undertaking; findings from the qualitative study (Phase 1); co-production with employees; and the use of a relevant theoretical framework (COM-B model and the Behaviour Change Wheel). This information will be supplemented by learning from previous intervention development work conducted by the lead researcher at SchARR (ethics approval reference: 0745/KW).

Staff at each participating organisation will be asked to volunteer to be part of an intervention development group (one group for each organisation). Co-production will help to ensure staff "buy-in" and that the intervention is tailored to address specific needs of each organisation. Hence, the intervention developed for one organisation is likely to be different to another. The intervention development group within each organisation will meet at a time and place most convenient for the participants. The initial meeting will likely take up to an hour. Depending on the outcome/progress of the initial meeting, a second group meeting may be required or it may be possible for subsequent discussions to occur via email. A baseline questionnaire will be also completed by participants providing some basic demographic/ background details (postcode, age, gender, ethnicity, educational attainment, job title, summary of job role, work-time equivalent).

The framework for the intervention development groups will involve the lead researcher presenting the context of the research project by highlighting the associations between prolonged sitting and health, followed by a "brainstorming" session where strategies can be identified by the volunteers on how to reduce workplace sitting time in their specific setting. In addition, to further empower the members of this group and if they feel it would be useful, they may be recruited as "agents of change", taking on the role of workplace champions encouraging colleagues to sit less.

Although the final content of the interventions is currently unknown, based on the lead researchers' previous intervention development work, the evidence-base, and due to the low-cost limitation, the intervention development group may suggest elements such as:

- Posters or prompts to remind staff to sit less
- Emails with helpful tips of ways to sit less e.g. walking or standing meetings
- A social element involving workplace champions
- The use of social media to spread the message of the intervention and its benefits
- Support from management via emails and "leading by example"
- Changes in the way the environment is used e.g. encouraging the use of toilets/printers on different floors.

During the intervention development meetings at each organisation, suggestions for intervention elements will be documented by notes taken throughout the meeting on a flip chart and, if required (e.g. in the case of some posters or point-of-decision prompt design), developed by the lead researcher or the volunteers depending on participants' preference. Pre-existing posters from previous work by the lead researcher could also be utilised. The final content and plan of each organisation-specific intervention (intended to last 12 weeks) will be shared with the respective intervention development group prior to moving to Phase 3 of this research project

(intervention implementation and evaluation), allowing a period of time for critical feedback, to ensure it is representative of the co-production discussions.

The intervention development meetings will be evaluated as part of a process evaluation using questionnaires with open questions to allow for more qualitative feedback on how the meetings were conducted.

3. Personal Safety

Raises personal safety issues? Yes

Personal safety management

Both phases of this research project described in this ethics application will involve the lead researcher conducting activities off the University premises. However, for Phase 1 it is hoped that another researcher will join the lead researcher to take notes during the focus groups in each organisation, so lone working will be minimised. Where another researcher is not available and during Phase 2 where it is planned for the lead researcher to be working alone, appropriate mechanisms will be put in place to protect the safety of the lead researcher e.g. someone will always be aware of where she is supposed to be and for how long and a mobile phone will be carried at all times. Nevertheless, given the nature of the research it is unlikely that there will be any significant risks to the safety of the lead researcher.

Section D: About the participants

1. Potential Participants

Four organisations have been approached regarding their involvement in this study: one public sector, one large private sector, one small business, and one voluntary sector organisation. Different workplace settings are being selected to increase the generalisability of the findings. It is from these organisations the participants will be drawn from.

Depending on the organisation size, it is anticipated that within each organisation:

- Four to eight employees and four to eight managers will engage in Phase 1
- Four to eight volunteers will take part in Phase 2

It will not necessarily be the same participants involved in Phase 1 and Phase 2 - participants will decide if they would like to be involved in one or both of the phases. There will be separate recruitment processes for each phase to facilitate this.

Employees and line managers who meet the following inclusion criteria will be invited to participate in the research project:

- Aged 18 years or older
- Spend the majority of their working day sitting.

These employees will be identified where possible via human resources email lists. For example, a large organisation may be able to identify those employees and managers who are office-based, and hence most likely to meet the inclusion criteria, versus those employees who have no fixed/a mobile base. This will require close liaison with each organisation's human resources department. Additionally, individual organisation governance arrangements will need to be adhered to (if applicable).

There is potential concern that employees of the participating organisations may not be in a position to exercise unfettered informed consent as a result of undue pressure placed on employees by their employing organisation to get involved in the study. Every attempt will be made to ensure organisations do not apply any pressure on employees and that potential participants are aware that there is no requirement to participate. Due to the nature of this study topic - the need to look for interventions to reduce sitting time and the workplace being a key setting where prolonged sitting is an issue - this study cannot be conducted in an alternative setting.

2. Recruiting Potential Participants

All employees and line managers at each organisation who meet the inclusion criteria described above will have the opportunity to participate in this study.

For phases 1 and 2, convenience samples of participants will be recruited via an email requesting volunteers. If a range of job roles are not recruited at this stage, a second email will be sent specifically targeting employees in the under-represented job roles (with liaison with human resources departments). Email accounts will be accessed using the organisations' email distribution lists. The email will be drafted by the lead researcher, but sent by an administrator within the organisation in order to address potential data protection issues. One email will be sent to recruit for Phase 1 and a second email sent to recruit for Phase 2 (the emails will be at least 3 months apart allowing for Phase 1 to be completed prior to Phase 2 commencing). The emails will provide a brief background to the research project, what participation in that specific phase will involve and the lead researcher's contact details for expressing interest in study involvement. A copy of the participant information leaflet will also be attached to the email providing additional details of the study and they will be advised to contact the lead researcher (via phone or email) if they have any questions relating to the study.

2.1 Advertising methods

Will the study be advertised using the volunteer lists for staff or students maintained by CiCS? No
- not entered -

3. Consent

Will informed consent be obtained from the participants? (i.e. the proposed process) Yes

All potential study participants will be provided with the relevant participant information leaflet for the particular phase via email and informed that they can call or email the lead researcher with any questions or queries relating to involvement in the research study that they may want to discuss. In order for participants to provide informed consent, the participant information leaflet will include: - Details of the overall research project including its importance and aims - What would be expected of them by participating in the phase of interest (e.g. time commitments and information they would need to provide) - What the potential risks are to participating and what will be done to minimise these risks (as described below) - Details of how the data they provide will be stored and kept confidential to all (including their employing organisation) - It will be clearly highlighted that there should be no pressure for them to participate in the study and that they can withdraw at anytime without having to give a reason - Contact details of the lead researcher and primary supervisor will be given if they would like to ask any questions or raise any issues of concern. If they would like to participate, they will be asked to sign the relevant informed consent sheet (associated to the phase they would like to be involved in) when they attend the focus

group discussion/intervention development meeting.

4. Payment

Will financial/in kind payments be offered to participants? No

- not entered -

5. Potential Harm to Participants

What is the potential for physical and/or psychological harm/distress to the participants?

There is limited potential for any form of harm to participants during their involvement in phases 1 and 2 of this research project. There is a small possibility that during the focus group discussions (in Phase 1) sensitive issues may be brought up by the participants e.g. bullying in the workplace or difficult relationships with colleagues, which have the potential to cause psychological distress. Participation in phases 1 and 2 will not put participants at any additional risk of physical harm over and above any background risk attending their workplace may entail.

How will this be managed to ensure appropriate protection and well-being of the participants?

Prior to beginning the focus group discussions (in Phase 1), "ground-rules" will be set with agreement of the participants which will include keeping information discussed during the focus group between the group only. Hopefully, this will allow participants to feel more comfortable to discuss potentially difficult issues. If sensitive issues are raised by the participants, then the lead researcher will signpost participants to relevant material/support.

Section E: About the data

1. Data Confidentiality Measures

During both phases 1 and 2, a baseline questionnaire will be completed by the participants providing some basic demographic/ background information (e.g. postcode, age, gender, ethnicity, educational attainment, job title, job role, work-time equivalent). It may be the case, particularly for participants in the small business where the sample will be drawn from a small population, that even when collated, this background information is enough to disclose the identity of participants. If this is the case, this data will not be published and withdrawn from any analyses.

All participant's will be given a unique identifier to anonymise the data collected as part of the focus group discussions and intervention development meetings, however, it will be possible for the lead researcher to re-identify the participants if required e.g. if further information is needed for clarification from an individual.

It will be further highlighted to participants in the information leaflet that identifiable data will not be shared with the employer. An organisation-specific report will be produced at the end of the entire research project, but the data presented here will be anonymised and no participant identifiable information will be published.

Finally, it may be difficult for employees to mask their involvement in this study from their colleagues and employer (again particularly in the small business) due to the fact that the focus group discussions/ intervention development meetings will be taking place within the workplaces

of the participants and during working hours. Every attempt will be made for study involvement to be masked, but due to pragmatic difficulties of this, this issue will be explicitly highlighted in the information leaflet. Given the fact that the nature of the information being sought in both the focus group discussions and intervention development meetings is unlikely to be particularly sensitive, it is not anticipated that this will be a major concern.

2. Data Storage

The lead researcher (KM) will have control of all the data generated by this research project. This data includes:

- Phase 1: background and demographics from baseline questionnaires, audio-recordings of focus group discussions (x2 per organisation), transcriptions of focus group discussions
- Phase 2: background and demographics from baseline questionnaires, notes taken from intervention development meetings, email correspondence regarding the final interventions, content of final interventions and feedback gained from evaluation questionnaires.

The focus group discussions (in Phase 1) will be audio-recorded using an un-encrypted device, but transferred over to an encrypted computer as soon as possible and then deleted from the recording device. During the transcription of the focus group discussions, all participants will have their names removed and given a unique identifier instead.

Data analysis will be conducted by the lead researcher and take place primarily at her workplace using an encrypted, password-protected computer. Occasionally data analysis may occur in the home of the lead researcher using an encrypted (already completed by SchARR IT), password-protected laptop.

All data generated by this research project will be stored in an access-controlled folder on the University of Sheffield's X drive. Access to this folder will be granted to the lead researcher and supervisory team. The benefit of using the X drive is that it is backed up by CiCS so there is no need to make additional copies of the data.

This overall research project forms a feasibility study, which it is hoped will inform the development of a larger trial in the future. Therefore, there may be a need to access the data in the future. Consent for the future use of the data will be explicitly sought via the consent form.

This project is funded by the National Institute for Health Research (NIHR) as part of a Doctoral Research Fellowship. During peer-review of the application, no concerns were raised regarding the data storage and management plans for this research project.

Section F: Supporting documentation

Information & Consent

Participant information sheets relevant to project?

Yes

Participant Information Sheets

- [Participant_Information_Leaflet_Phase_2.docx](#)
(Document 032455)
- [Participant_Information_Leaflet_Phase_1.docx](#)

(Document 032454)

Consent forms relevant to project?

Yes

Consent Forms

- [Consent_Form_Phase_2.docx](#) (Document 032443)
- [Consent_Form_Phase_1.docx](#) (Document 032442)

Additional Documentation

- [Phase_1_Topic_Guide.docx](#) (Document 032181)
Phase 1 Focus Group Topic Guide
- [Feedback_Questionnaire_Phase_2.docx](#) (Document 032438)
Phase 2 Evaluation Questionnaire for Process Evaluation
- [Baseline_Questionnaire_Phase_2.docx](#) (Document 032187)
Phase 2 Baseline Questionnaire
- [Baseline_Questionnaire_Phase_1.docx](#) (Document 032186)
Phase 1 Baseline Questionnaire
- [LetterOfIntent_DRF_2016_09_023.doc](#) (Document 031781)
Confirmation of NIHR Doctoral Research Fellowship Funding
- [Summary_Reviews_15-44-18-519.pdf](#) (Document 031780)
Peer-Reviews of NIHR Doctoral Research Fellowship Application
- [Final_Application.pdf](#) (Document 031779)
NIHR Doctoral Research Fellowship Application (including research proposal)

External Documentation

- not entered -

Official notes

- not entered -

Section G: Declaration

Signed by:

Kelly Mackenzie

Date signed:

Thu 22 December 2016 at 10:07

d: Phase 1 and 2 ethics approval letter



Downloaded: 31/01/2017

Approved: 31/01/2017

Kelly Mackenzie

Registration number: 160215535

School of Health and Related Research

Programme: Health and Related Research (PhD/Health & Related Res FT) - HARR31

Dear Kelly

PROJECT TITLE: Feasibility of a low-cost, co-produced complex intervention to reduce workplace sitting time in different workplace settings

APPLICATION: Reference Number 012219

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 31/01/2017 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 012219 (dated 30/01/2017).
- Participant information sheet 1026219 version 3 (30/01/2017).
- Participant information sheet 1026218 version 2 (30/01/2017).
- Participant consent form 1026209 version 1 (21/12/2016).
- Participant consent form 1026208 version 1 (21/12/2016).

If during the course of the project you need to [deviate significantly from the above-approved documentation](#) please inform me since written approval will be required.

Yours sincerely

Jennifer Burr

Ethics Administrator

School of Health and Related Research

Appendix 5: Phase 1 baseline questionnaire

Thanks for agreeing to participate in Phase 1 of the Sit Less @ Work Project. I would like to collect some background information in order to help me interpret the findings from the discussion.

This questionnaire should take no longer than 5 minutes to complete.

1. Can you please state your home postcode? _____

2. What is your age? (Please circle)

| | |
|-------|-------|
| 18-24 | 45-49 |
| 25-29 | 50-54 |
| 30-34 | 55-59 |
| 35-39 | 60-64 |
| 40-44 | 65+ |

3. What is your gender? (Please circle)

| | | |
|------|--------|-------------------------------|
| Male | Female | Other (please specify): _____ |
|------|--------|-------------------------------|

4. What is your ethnicity? (Please circle)

| | |
|--------------------------------|-------------|
| White British | Indian |
| White Irish | Pakistani |
| White Gypsy or Irish Traveller | Bangladeshi |
| White and Black Caribbean | Chinese |
| White and Black African | African |
| White and Asian | Caribbean |
| Other (please specify): _____ | |

5. What is your highest educational attainment? (Please circle)

| | |
|---------------------------------|-------------------------------|
| Degree or equivalent | No qualification |
| Higher education | Don't know |
| A Level or equivalent | Other (please specify): _____ |
| GCSEs grades A*-C or equivalent | |

6. What is your job title? _____

7. Briefly describe your job role: _____

8. Are you full-time? (Please circle)

| | |
|-----|----|
| Yes | No |
|-----|----|

9. If answered no to question 8 above, what is your work-time equivalent (WTE)? _____

10. Approximately, how much of an average day do you spend sitting whilst at work? (Please circle)

| | | | |
|-------|--------|--------|---------|
| 0-25% | 25-50% | 50-75% | 75-100% |
|-------|--------|--------|---------|

Thank you for completing this questionnaire.

Appendix 6

a: Phase 2 recruitment email and participant information sheet

Recruitment email

Subject: Sit Less at Work Research Project



Dear [organisation] staff,

**Do you sit at your desk all day?
Are you interested in developing ways to reduce your workplace sitting time?**

My name is Kelly and I have been given permission by your organisation to carry out an exciting new research project looking at ways of reducing your sitting time at work.

Why is this important?

As you may have heard in the news recently, sitting for long periods puts you at a higher risk of a range of health problems such as neck/back pain, heart disease and diabetes. Finding ways to break-up and reduce your sitting time is therefore really important.

What is involved?

Phase 1 of this project has already been conducted within your organisation and involved gaining the thoughts of a group of SYHA staff on what may help or hinder you to sit less at work. I am now asking for volunteers to be involved in Phase 2 of the research, which will involve 1-2 short (each lasting approx. 1 hour) workshops where you will help to develop a package of changes aimed at reducing sitting time in your workplace.

The workshops will take place at a convenient location within your workplace at a date and time that suits the majority of volunteers. Please note, you can still volunteer for this part of the study even if you were not involved in Phase 1.

What next?

I have attached an Information Leaflet which provides much more detail, so please take a couple of minutes to have a read through that. Feel free to get in touch either via email or phone if you have any questions or queries (my contact details are at the end of the Information Leaflet).

If you would like to participate, please reply to me (kelly.mackenzie@sheffield.ac.uk) by [time] on [date], after which I will arrange a suitable time/date for the first workshop.

Many thanks for your time.

Best wishes, Kelly

Sit Less at Work Phase 2 Participant Information Sheet

You are being invited to take part in a research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. If you would like to arrange a meeting with the lead researcher, please find her contact details at the end of this information sheet. Alternatively, feel free to contact her with any questions you may have or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

1. Research project title

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations

2. What is the project's purpose?

Background

Sitting for long periods is linked to higher risks of health problems such as heart disease, diabetes, obesity, depression, neck/back problems, and early death. This link between sitting and poor health is present even for people who take part in regular exercise, if they spend the rest of their day sitting. Therefore, replacing some sitting time with light activities, such as standing and walking, could be an important way to improve health.

Workplace sitting is a particular issue when thinking about how to reduce the total amount of sitting time. This is because of the increase in desk-based jobs where workers sit for an average of six-hours a day. Therefore, there is a need to develop, test and review the practicality of changes in the workplace aimed at reducing time spent sitting. To encourage employers to support such changes, they must be low-cost and not negatively impact workers' productivity.

Aims

The overall aim of this study is to develop, test and review how practical a low-cost package of changes is at reducing sitting time within different types of workplaces.

This study is being split into three phases:

- Phase 1 aims to explore the specific issues in the workplace that cause you to sit for long periods
- Phase 2 aims to develop a low-cost package of changes with a group of staff members to ensure it is tailored to the specific issues in your workplace
- Phase 3 aims to test out the package of changes and to see if it results in a decrease in sitting time at work.

It is Phase 2 of the study that you are being invited to participate in at this stage.

3. Why have I been chosen?

You have been chosen as your organisation has identified your job role as one that requires you to sit at a desk for long periods of time whilst at work.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part in the study. Your organisation has been informed that they should not put any pressure on you to participate. If you do agree to participate, you should know

that you can withdraw from the study at any time, without having to give a reason. However, any data collected up to that point will be kept by the research team.

5. What will happen to me if I take part?

As part of Phase 2 of this study, you will be required to participate in workshop sessions with a group of up to 8 of your colleagues, each session will last approximately 1 hour (maximum 2 sessions will be required). This workshop will occur within your workplace and at a time that is most convenient for you and your colleagues. Your organisation has agreed to allow you to participate in this discussion as part of your work time and you will not be financially penalised for taking part. The workshop will involve the development of a low-cost package of changes (to be rolled out over 12 weeks) to reduce sitting time for employees in your workplace. Prior to the workshop, you will also be asked to complete a brief questionnaire, which will provide the research team with some background information including your age, gender, ethnicity, job title or job role.

By agreeing to participate in Phase 2 of this study, you are not agreeing to participate in future phases of this study and there will be no obligation for you to do so.

6. What do I have to do?

If you agree to take part, the lead researcher will provide a list of potential times and dates for the discussion to be held and you will need to let the lead researcher know the most convenient times for you. You will then need to attend up to 2 x 1-hour workshops and be prepared to develop ways to reduce sitting time in your workplace. You may also need to participate in email discussions after the workshops to finalise the details of the package of changes. You will need to complete a short feedback questionnaire regarding the process of developing the package of changes at the end of the phase.

7. What are the possible disadvantages and risks of taking part?

As the workshop will be taking place during your working day, it is likely that your colleagues or line managers will be aware that you are taking part in the study, so if this is of a concern to you please get in contact with the lead researcher. Also, you will need to give up 1-2 hours of your working time to be part of this study, although this will be at a time convenient to the majority of the volunteers. This has been agreed by your organisation, so you do not need to seek specific permissions to participate, although you may wish to let your line manager know that you are planning to participate.

There are no foreseen psychological or physical risks to participating in this research.

8. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in the project, this second phase of the research project aims to develop a low-cost package of changes tailored to your workplace to reduce sitting time. Reducing workplace sitting time is important for your health and may also help improve concentration-levels and how effectively you work.

9. What happens if the research study stops earlier than expected?

If this is required, the reason(s) will be clearly explained to you.

10. What if I am unhappy about something?

If you wish to make a complaint about the way the research project is being conducted, then you should raise this in the first instance with the project supervisor (contact details at the end of this leaflet). If you feel that

your complaint has not been handled satisfactorily you can contact Professor John Brazier, Dean of the School of Health and Related Research at the University of Sheffield on 0114 2220726 or via email: j.e.brazier@sheffield.ac.uk who will address any further concerns you may have.

11. Will my taking part in this project be kept confidential?

As mentioned previously, given that the workshop is planned to be held within your workplace, it is likely that your colleagues or line manager will be aware that you are taking part in the study. However, all the information that is collected about and from you during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications.

12. What will happen to the results of the research project?

The package of changes developed by you and your colleagues will then be put into action and assessed during the final phase of this research project. Information collected and ideas developed during this phase may also be used for subsequent research projects if appropriate.

It is planned that the process of developing the package of changes will be published in an academic journal and possibly presented at academic conferences. At the end of the overall research project, a summary of the results and outcomes from all three phases will be included in a report for your organisation and a copy will also be made available to everyone who participated in any phase of the study. You will not be able to be identified in any reports or publications.

13. Who is organising and funding the research?

The National Institute for Health Research (NIHR) is funding this research as part of the lead researcher's training fellowship and PhD project.

14. Who has ethically reviewed the project?

The School of Health and Related Research Ethics Committee has ethically reviewed and approved Phase 2 of this research project.

For further information, please contact:

Lead researcher:

Kelly Mackenzie, 07740786072, kelly.mackenzie@sheffield.ac.uk

Project Supervisor:

Elizabeth Goyder, 0114 2220783, e.goyder@sheffield.ac.uk

Prior to taking part in the study, you will receive a printed copy of this information sheet and a copy of the consent form to keep for your records.

Thank you very much for agreeing to take part in Phase 2 of this research study.

b: Phase 2 consent form

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations (Phase 2)

Name of Researcher: Kelly Mackenzie

Participant Identification Number for this project:

Please initial box

1. I confirm that I have read and understand the information sheet dated 21st March 2017 explaining Phase 2 of the above research project and I have had the opportunity to ask questions about the project.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. However, any data collected up to that point will be kept by the research team. In addition, should I not wish to answer any particular question or questions, I am free to decline. To withdraw, contact Kelly Mackenzie on 07740 786072.
3. Although I realise that it may be difficult to mask from my colleagues/line manager that I am participating in this study, I understand that my responses will be kept strictly confidential.
4. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.
5. I agree for the data collected from me during the workshop to be used in future research.
6. I agree to take part in Phase 2 of the above research project.

| | | |
|---------------------|-------|-----------|
| _____ | _____ | _____ |
| Name of Participant | Date | Signature |
| _____ | _____ | _____ |
| Lead Researcher | Date | Signature |

To be signed and dated in presence of the participant

Copies:

Once this has been signed by all parties, the participant should receive a copy of the signed and dated participant consent form, the information sheet and any other written information provided to the participants. A copy of the signed and dated consent form should be placed in the project's main record (e.g., a site file), which must be kept in a secure location.

Appendix 7

a: Phase 2 Workshop 1 outline

Prior to the workshop send a briefing paper to all participants stating:

- Aims of workshop 1 – brainstorming – to get some initial ideas of ways to sit less at work without reducing productivity, either by regularly interrupting sitting time or by replacing longer periods of sitting time with standing or moving
- Details of the session – date, time, state it will last no longer than an hour, hopefully it should be fun and relaxed!
- Advise to start having a think about ideas which relate to four main areas and make a note of any ideas they have and bring them with them on the day
 - What you can do
 - What you could do as a team or how your team / colleagues could support you
 - What the organisation could do
 - How the environment could be changed
- State the ground rules – no idea is too radical and no negativity

During the workshop:

Items to bring – post-it notes, flipchart paper, marker pens, consent forms, participant information sheets, baseline questionnaires and feedback questionnaires

Ask participants to complete a baseline questionnaire and consent form and provide them with a copy of the participant information sheet

Re-emphasise the ground rules – no idea is too radical and no negativity

Ice-breaker (standing up)

- Think of an object that begins with the first letter of your surname
- Write it on a post-it note and stick on your forehead
- Pair-up
- You have 5 mins to come up with a new product that incorporates / links the 2 objects – it doesn't need to be realistic and there are no cost limitations
- Each pair to briefly explain their product

Any ideas that they had prior to the meeting, to be written on post-it notes now (for the quieter group members who may feel intimidated sharing ideas as they go round)

Activity 1 (all standing up and moving around the room)

- Place 5 sheets of flipchart paper around the room
 - What can you do?
 - What could you do as a team or how could your team / colleagues support you?
 - What could the organisation do?
 - How could the office environment be changed?

- One sheet blank for ideas that don't fit in any of the above categories
- Split up into 4 groups and each group go to a corner of the room with a different flipchart sheet category
- Place initial ideas on a post-it note – can do individually or discuss as a group
- Spend 5 mins in each corner and then rotate
- As you rotate through you may not be able to think of any additional ideas, so then try to further develop the ideas that are already there – thinking about the detail of how it could be achieved

Activity 2 Provocative Operator (depending on time) – show worked example to demonstrate

- Print out the page in the Thinker Toys book with random words on
- Each participant has a blank sheet of paper
- State the objective – i.e., to find ways of sitting less at work
- Ask participant to close eyes and select a word at random
- Down the LHS of the paper, write down ten characteristics of the random word e.g., tree – loses leaves in winter, trunk gets bigger each year, improves the environment
- Now force a connection between each characteristic and the issue of ways to reduce workplace sitting – these can be very bizarre, but you have to force a connection between every characteristic, often the breakthrough comes from combining two or more ideas/connection
- Whatever word is chosen, it's up to the group to try to link or associate that word with ways of sitting less at work

Next steps

- I'll try to refine the ideas and then workshop 2 will be deciding which ideas to use and how/when to use them
- Workshop 2 will be in 2-3 weeks – could use rapid prototyping:
 - If come up with some ideas, get them to vote on the favourite (or I could select one I think is best based on the evidence)
 - Then get them to add “meat to the bones” i.e., what would it look like in practice, what are the key points, timings, who's going to run it, what language should be used?
 - This allows something more concrete to be developed

Finish

- Complete feedback questionnaires
- Any questions, thanks

b: Phase 2 Workshop 2 outline and idea planning proforma worked example

Phase 2 Workshop 2 outline

Prior to the workshop send a briefing paper to all participants stating:

- Aims of workshop 2 – to formulate a detailed package of changes to be rolled out over 12 weeks using the ideas from the first workshop
- Details of the session – date, time, state it will last no longer than an hour, hopefully it should be fun and relaxed!

From my framework, needs to consider:

- Identify and use theory – ecological model
- Management involvement – consultation
- Staff involvement – setting up a workplace sitting committee or running consultation events
- Tailor intervention, menu of strategies required, target multiple levels of influence
- Workplace champions
- Low-cost – what does that mean for staff?
- Interrupting sitting vs replacing prolonged sitting with standing or moving
- Understand local organisational processes and structures
- Decide on leadership – I can't run it
- Find out about organisational culture, structure and hierarchy

During the workshop:

Items to bring – consent forms, participant information sheets, workshop 1 ideas, idea proformas, feedback questionnaires

Complete consent form and provide them with a copy of the participant information sheet.

Highlight the aim of this session – to formulate a detailed package of changes to be rolled out over 12 weeks using the ideas from the first workshop

Explain that the point of this intervention is for it to be run with as little involvement from me as possible, as I'm looking to see if this process is something that could work in any organisation. However, for the purposes of this research project I will be taking certain before and after measures and conducting focus groups after the intervention period to determine what worked and why, but the actual running of the intervention itself is going to be down to you and your organisation.

Initial brief discussion and notetaking on the following:

- How do things get done in this organisation? Whose support is required? How can the intervention become embedded within the organisation?
- Find out about organisational structure

Ask participants to review the ideas from the first workshop:

- Do participants agree with how I've clustered?
- Check why some of the ideas not practical – cost, lack of changing facilities etc.

Participants to select 1-5 ideas from each level (aim for 4-10 ideas, with at least 1 from each level)

Go through each selected idea and discuss how it can be implemented over the 12-week period by completing the printed proforma (as one big group)

Need to discuss at the end who is going to lead this package of changes. Do they want to set-up a sit less, move more committee to spread the load of responsibility?

Next steps

- I'll put the ideas into a summary document and circulate for comment
- Once the summary document is agreed and a start date for the intervention decided upon, that will signal the end of my involvement in the roll-out of the intervention
- 1 week before the intervention start date and 1 week after the 12-week intervention period, I will take measures from volunteers. I will also conduct focus groups a few weeks after the end of the intervention period to understand what did/didn't work and why
- If you are wanting to continue the intervention after the 12-week period, that is absolutely fine

Finish

- Complete feedback questionnaires
- Any questions, thanks

Idea:

Take regular breaks

Content (SMART):

Set-up a computer prompt which pops-up every hour to remind you to move away from your desk for at least 2 minutes. This can be either a standing or moving break.

What will the pop-up look like? Just a message in a small square box with the project logo on.

When will this occur during the 12-week intervention period?

This will begin on day 1, week 1 and continue throughout the 12-week period

Any leadership / management involvement required? If so, what and how?

Approval for this initiative will need to be obtained from the Chief Exec / MD. Email sent to staff to inform them of this initiative to come from Chief Exec / MD – giving staff permission to participate.

Anticipated problems:

Workload pressures may mean that unable to take a break and pop-ups may become annoying / cause frustration

How can these problems be overcome?

Have the ability to disable pop-ups temporarily

To be actioned by:

Prompts to be set-up by X (IT person) and email to all staff to inform them of this change sent by Y (admin person).

c: Phase 2 questionnaires for Workshop 1 and 2

Workshop 1 questionnaire

Thanks for agreeing to participate in Phase 2 of the Sit Less at Work Project. I would like to collect some background information in order to help me interpret the findings from the discussion.

This questionnaire should take no longer than 5 minutes to complete.

1. Can you please state your home postcode? _____

2. What is your age? (Please circle)

| | |
|-------|-------|
| 18-24 | 45-49 |
| 25-29 | 50-54 |
| 30-34 | 55-59 |
| 35-39 | 60-64 |
| 40-44 | 65+ |

3. What is your gender? (Please circle)

Male Female Other (please specify): _____

4. What is your ethnicity? (Please circle)

| | |
|--------------------------------|-------------|
| White British | Indian |
| White Irish | Pakistani |
| White Gypsy or Irish Traveller | Bangladeshi |
| White and Black Caribbean | Chinese |
| White and Black African | African |
| White and Asian | Caribbean |
| Other (please specify): _____ | |

5. What is your highest educational attainment? (Please circle)

| | |
|---------------------------------|-------------------------------|
| Degree or equivalent | No qualification |
| Higher education | Don't know |
| A Level or equivalent | Other (please specify): _____ |
| GCSEs grades A*-C or equivalent | |

6. What is your job title? _____

7. Briefly describe your job role: _____

8. Are you full-time? (Please circle)

Yes No

9. If answered no to question 8 above, what is your work-time equivalent (WTE)? _____

10. Approximately, how much of an average day do you spend sitting whilst at work? (Please circle)

0-25%

25-50%

50-75%

75-100%

The following questions are to help me understand your thoughts about the process of developing a package of changes for your organisation. If you could answer with as much detail as possible, that will be really helpful.

11. How did you find the workshop as a way of developing ideas for a package of changes to sit less in your organisation?

12. What was particularly good about the workshop / what went particularly well?

13. Was there anything that could have been improved?

14. Any other comments or feedback:

Thank you for completing this questionnaire.

Workshop 2 questionnaire

Thanks for agreeing to participate in Phase 2 of the Sit Less at Work Project. I would like to collect some background information in order to help me interpret the findings from the discussion.

This questionnaire should take no longer than 5 minutes to complete.

1. Can you please state your home postcode? _____

2. What is your age? (Please circle)

| | |
|-------|-------|
| 18-24 | 45-49 |
| 25-29 | 50-54 |
| 30-34 | 55-59 |
| 35-39 | 60-64 |
| 40-44 | 65+ |

3. What is your gender? (Please circle)

| | | |
|------|--------|-------------------------------|
| Male | Female | Other (please specify): _____ |
|------|--------|-------------------------------|

4. What is your ethnicity? (Please circle)

| | |
|--------------------------------|-------------|
| White British | Indian |
| White Irish | Pakistani |
| White Gypsy or Irish Traveller | Bangladeshi |
| White and Black Caribbean | Chinese |
| White and Black African | African |
| White and Asian | Caribbean |
| Other (please specify): _____ | |

5. What is your highest educational attainment? (Please circle)

| | |
|---------------------------------|-------------------------------|
| Degree or equivalent | No qualification |
| Higher education | Don't know |
| A Level or equivalent | Other (please specify): _____ |
| GCSEs grades A*-C or equivalent | |

6. What is your job title? _____

7. Briefly describe your job role: _____

8. Are you full-time? (Please circle)

| | |
|-----|----|
| Yes | No |
|-----|----|

9. If answered no to question 8 above, what is your work-time equivalent (WTE)? _____

10. Approximately, how much of an average day do you spend sitting whilst at work? (Please circle)

| | | | |
|-------|--------|--------|---------|
| 0-25% | 25-50% | 50-75% | 75-100% |
|-------|--------|--------|---------|

The following questions are to help me understand your thoughts about the process of developing a package of changes for your organisation. If you could answer with as much detail as possible, that will be really helpful.

11. How did you find the workshop as a way of formulating a plan for a package of changes to sit less to be rolled-out in your organisation? Can you see how this plan could work in your organisation? Were barriers addressed?

12. What was particularly good about the workshop / what went particularly well?

13. Was there anything that could have been improved or done differently?

14. Any other comments or feedback:

Thank you for completing this questionnaire.

Appendix 8: Ideas from Workshop 1 by organisation and level of influence

Table 1: Outputs from Workshop 1 for each organisation by level of influence

| Ideas | Small business | Charity | Local authority | Large corporation |
|----------------------|--|--|---|--|
| Intrapersonal | <ul style="list-style-type: none"> • Lunch trip by foot • Walk to shop / Tesco • APP-alarm walk • Stand-up regularly • Stand-up when on a phone call • Make office manager coffee every 2 hours • Break every hour • Raise awareness • Switch monitor off • Lying down • Run a mile | <ul style="list-style-type: none"> • Podcasts / voice memos vs docs / emails – walk and listen • Personal behaviour / self-discipline – challenge yourself to move away from your desk for 10 minutes every hour • Seek out people at their desk rather than email or phone – keep the door open your office to facilitate this • Personal targets for steps/day and track activity using FitBit, or pedometers, record steps to see benefit of “walking / standing day” • Walk to work 1 day a week or getting off public transport earlier and walking the rest • Take regular short breaks • Use the stairs and not the lift • Make your own drinks • Lunch outside office, walk to get lunch (don’t bring your own food all the time) • Get out of the office more • Centralised kitchen, storage, toilets – go and collect rather than delivery • Encourage others to be active • Be a positive influence for team, show good behaviours and reinforce cultural change • Stand on one foot when making drinks etc. • Drink more water • Understand the links between sitting and health | <ul style="list-style-type: none"> • Walk over to talk to people • Don’t always book meeting rooms on the floor that you work on • Walk up and down a floor for exercise during the day • Over lunch go for a walk • Use stairs instead of lift • Join exercise class / informal exercise gear in the atrium • App on phone – if not moved, you get a prompt, reminder to get up regularly • Stand on a regular basis • Walk to meetings locally • Active travel to work – walk / cycle – if you live too far away, get off a few stops early | <ul style="list-style-type: none"> • Use stairs not lift • Take action with FitBit prompts to move • Plan diary • Drink more water • Stand-up for calls • Use coffee app (get free coffee at Patisserie Valarie each day) • Be more mindful • Messages that moving more is good, can transform the body, fidgeting good, limit time seated |

| | | | | |
|-----------------------|--|---|--|---|
| Interpersonal | <ul style="list-style-type: none"> • Help support others • Hi-fives • Wii games, SNES • Walk to the Stag (pub) • Ping pong • Yoga • Sub-teams – pairs am/pm walks • Paired exercises • Competitions – press-ups etc. • Company dog to walk • Dance competition • All go to gym and bench | <ul style="list-style-type: none"> • Lunchtime bike or walking group or other activities group • Go out once a week as a group to encourage each other • Work together to help change collective behaviours • Hold team meetings stood up • Team competition or incentive – who’s sat least this week (use FitBit / pedometers to measure)? • Challenge the norm of sitting down each meeting • Don’t get each other a drink – all get up and make your own • Remind one another you’ve been sat a long time • Support each other – it’s ok not to be sat at desk all the time • Booking in standing or walking meetings • Take short breaks – colleagues cover front desk and serve • Outdoor 1:1 meetings | <ul style="list-style-type: none"> • Encourage others to move about • Activity based team day • Every hour, whole team stands up for 5+ minutes and stretches legs / back / arms • Informal office sports / games • Step competitions – pedometer, daily, weekly, monthly • Walking / running group • Community team group e.g., litter pick • Charity walks • Standing team meetings • 1 day per week, all working at standing desks • Engage / interact with different people in different areas • Teams to learn how to dance | <ul style="list-style-type: none"> • Introduce “energisers” to meetings • Build activity into team meetings • Be more diverse with settings for team meetings • Team challenges / competitions on iPhone etc. aim for a certain number of steps – use colour charts to monitor – red bad, get paler the more active you are |
| Organisational | <ul style="list-style-type: none"> • Policy for moving, water policy / wee policy • Impose rules • Change attitude to sitting • Stand up or “get gunged” • Notification to move / stand • Reward for sitting less • Pedometer / FitBit (or individual?) • Organised activities • Bring back PT day | <ul style="list-style-type: none"> • Celebrate changes / achievements, Tell us your sit less stories • Hot-desking (working in teams) – need support from IT • Change the culture that you are only working at your “station” • Build activity into team meetings • Encourage people to lunch together • Encourage spontaneity from staff • No lunch at desk • Car-free day • Email-free day • No meetings longer than 1 hour • Shorter stand-up meetings • IT system prompt if on PC for over 2 hours (or specified time) | <ul style="list-style-type: none"> • Raise awareness in terms of health benefits including stress relief • More exercise / health / wellbeing messaging with practical encouragement e.g., 1 day a week no lifts • Financial incentive / flexi to get up for a period throughout the day • Traffic light system for how well we are doing – reward system • Over the tannoy – “Hi di hi!” and stand up • Standing meetings • Walking meetings • Flash up message on Jabber etc. • Encouragement from management | <ul style="list-style-type: none"> • Extra holidays for logging active hours or other rewards system • Run challenges for points / prizes • Make rewards site easier to access |

| | | | | |
|----------------------|---|--|---|---|
| | <ul style="list-style-type: none"> • Work upstairs with phones, downstairs LOL • Regular game • Utilise own technology to force • Electrocute chairs if sat for >2 hours • Pay gym memberships • Gaming rehab “operation sit less” | <ul style="list-style-type: none"> • Incentivise stair use, de-incentivise lift use • Incentives – encouragement to walk to other side of building for a snack, reward for walking/steps • Encourage walking / steps competitions • Walk, talk, email – re-order people’s responses • Changes in policies and guidelines • Walking and thinking • Give permission so feel able to leave desk • Encourage persistence with initiatives such as walking 1:1s • Programme of standing activities e.g., yoga et • Mobile phones so you don’t have to stay at your desks • Invest in mobile technology | <ul style="list-style-type: none"> • Include motivation around improving health and wellbeing in 1:1s • Guidance and employee support of how to move more e.g., ideas of good stretches to do at your desk • Policy, guidelines, information, suggestions, permission to do • Continue to promote active travel • Make activity breaks as “acceptable” as smoke breaks used to be – less rigid with clear desks policies etc. • Freedom to move around • Maintain the pool cycles better and promote them more – pool cars under 3 or 4 miles, check why not cycled? • Get someone else in to show us how to do it properly e.g., Google type • Change Draconian clear desks policy • Enforced activity break • Exercise classes e.g., Zumba, step class, yoga | |
| Environmental | <ul style="list-style-type: none"> • Kneel stool • Weighted mice • Wireless / longer headset cable • Office dumb-bells • Electric rising desks / varidesk • Standing desks and stool • Standing desks with stool • Supply treadmill desks • Uncomfortable chairs – make you stand-up • Wind-up coffee machine (bike) • Exercise bike | <ul style="list-style-type: none"> • Rooftop track (in new building) • High tables to have stand-up meetings • Signage – calories burnt on the stairs, lift sign directing to stairs • More interactive spaces • Outside desk space for own equipment / meetings • More stand-up areas, less chairs • Chairs stacked as standard in meeting rooms or remove chairs – less likely to sit down • Different positioned chairs • Psychology of supermarkets – removing bins, redesign office regularly (teams etc.) • Clear office / desk – get up to get what you need | <ul style="list-style-type: none"> • Under-desk cycling pedals • Standing desks in meeting rooms – poser tables • More standing desks – 1 per bank of 6 desks • Phone change e.g., walk around when talking on the phone • Alternative seating e.g., exercise balls, sit-stand chairs (stools that you can lean on), one uncomfortable chair in each work area • Landscape private outdoor space • Walking route round the office or on the roof • Sporting room e.g., table tennis, snooker, pool, air hockey, Wii, virtual reality | <ul style="list-style-type: none"> • Stability balls for seats • Standing hot-desk, option of standing desk |

| | | | | |
|--|---|--|--|--|
| | <ul style="list-style-type: none"> • Cross-trainer • Shower room • Waterslide, standing hot tub • Bigger, got to run further • Move closer to the park | <ul style="list-style-type: none"> • Storage space for workout gear • External venues for meetings • VR / AR / MR technology – interact with IT • Moving location with arrival of volunteers • Screens on the wall, not desk height • Take wheels off chairs • Gym at work and showers nearby • Activity areas – arm bike, weight machines, pedals, vibrating plates • Reduce numbers of stairs • Treadmills around the building • Treadmill desks • Desks that can raise, Higher level desks with no seats, or desks that raise and lower • Hot-desking with standing desks • Standing desks with high chairs | <ul style="list-style-type: none"> • Gym and facilities • Informal exercise area downstairs • Relaxation zone / bean bags | |
|--|---|--|--|--|

Appendix 9: Detailed description of actions by organisation

Table 1: List of detailed actions for the small business

| Action | Content | Timing | Management involvement | Barriers | How to overcome barriers | Who to action |
|---|---|--|---|---|--|--|
| Emails from management as a way of encouraging and supporting staff (Org) | Initial email from MD highlighting the start of the 12 weeks and what staff can expect. Emails throughout the 12 weeks to keep encouraging staff to participate in various initiatives. | Day 1, week 1 | Management to take charge of this | Time | Block out time in diary to undertake this task | MD |
| Take regular breaks (Intra & Org) | Set-up a computer prompt which pops-up every hour to remind you to move away from your desk for at least 2 minutes. This can be either a standing or moving break. Pop-up will be a message in a small square box with the project logo on | Day 1, week 1 | Approval required from MD via an email sent to staff to give staff permission to participate | Workload pressures may mean that unable to take a break and pop-ups may become annoying / cause frustration | Have the ability to disable pop-ups temporarily | KE to develop pop-up, asks who would like it installed and ensure all who request it are able to access it |
| Exercise ball instead of chair (Env) | Exercise ball – one which rotates around the office, so interested staff can take it in turns to use Each to be rota'd to use it – aim for all interested to use 2-3 x weekly for 2-3 hours at a time Already have an exercise ball in the office | Day 1, week 1 | Approval required from MD via an email sent to staff to give staff permission to participate MD/TF to assess health and safety prior to starting | Where to store | Can be kept upstairs when not in use | NE to do a rota for use of the ball (to do whilst also doing lunch pick-up rota) |
| Do various activities which involve movement using some form of competition with a prize (e.g., a bottle of wine) at the end of each month | 1. Play Wii/PS4/SNES games that involve movement KE has a spare PS4 system which is already on site and there is an app which can be downloaded for free (phone then acts as the control). Games can involve standing, moving or dancing | Day 2, Week 1 2-3 x weekly in pairs | Approval required from MD via email sent to staff to give staff permission to participate MD/TF to assess health and safety prior to starting | Need to ensure no impact on service delivery May not include everyone – some may be put off by the idea of competition | Those less keen on taking part in the activities could still have a standing break, and do the scoring instead so not being excluded | KE ensure all have access to the gaming systems and app MD to purchase prizes |

| | | | | | | |
|---|---|--------------------------------------|--|---|--|--|
| (Inter) | 2. Play ping pong – best of 3 shots (place ping pong table over meeting table) 3. Paired exercises e.g., press-ups, boxing – focus on individual competition i.e., how you improve rather than comparing to others | | | | | KE to encourage participation and ensure all scored appropriately |
| Walk to shops for lunch / snacks (Intra & Org) | People doing the lunch pick-up Take it in turns – using a rota | Day 1, week 2 2-3 x weekly | Approval required from MD via an email sent to staff to give staff permission to participate | Weather The time to walk to and from the shops would currently be included in the lunch break time so no time to then eat lunch. | Purchase a large umbrella and keep by the front door. For those staff rota'd to do the lunch pick-up – the time required will not be included in lunch break i.e., they can take that time back from the organisation. | NE to ask who wants to be involved and then to write a rota |
| Use of social media to encourage staff to participate in the activities but also to advertise the good initiatives (Inter) | Videos of dancing competitions / exercises – put on Twitter, their website LinkedIn and Facebook Change the staff signatures via signature manager with links to what they're doing Use of "Sit Less at Work" branding | Day 1, Week 2 | No specific approval required, just encouragement from management to participate in activities so have something to talk about on social media | Time | Block out time in diaries to undertake this task | TF and MD to oversee, but will delegate some responsibilities to other staff |
| Add the "Sit Less at Work" initiative to the team meeting agenda Develop a policy (Org) | Team meetings can be used to discuss how the package is going Use the package of changes document as a working document for the policy which can be added to and developed over time to support sustainability if initiative | First team meeting in 12-week period | Approval for the policy will be required – all staff need to be in favour | No barrier, item is on agenda and staff in agreement | n/a | TF On agenda for Team Meeting on 11 th June |
| Wireless headsets to allow walking whilst on the phone | Wireless headsets (to be purchased) for all who would like them with the aim of being able to stand or walk whilst on the phone | Day 1, week 3 | Approval required from MD | Forget to use them | Include a reminder message to use with the computer | MD to purchase and distribute to staff |

| | | | | | | |
|--|---|-------------------------------|--|--|---|----------------------------------|
| (Env) | | | | | prompt to remind to break from sitting | |
| Exercises with office dumbbells (Inter) | Office dumbbells (to be purchased) and exercises to be undertaken | Day 1, week 3 2-3 x weekly | Approval required from MD via an email sent to staff to give staff permission to participate MD/TF to assess health and safety prior to starting | Need to ensure no impact on service delivery May not include everyone – some may be put off by exercise | Those less keen on taking part could still have a standing break, and help count reps so not being excluded | FH to lead the dumbbell sessions |

Table 2: List of detailed actions for the charity

| Action | Content | Timing | Management involvement | Barriers | How to overcome barriers | Who to action |
|---|--|---|---|--|---|---|
| Take regular short breaks (Intra & Org) | Incorporate various other suggestions here into an email from Chief Exec to encourage staff to take regular short breaks e.g., use stairs not the lift, make your own drinks, drink more water, “walk, talk, email”, lunch away from your desk / lunchtime walk, walking/standing meetings | Day 1, week 1 and weekly reminder emails after that | Chief Exec to send email | Making own drinks as there is a culture of rounds of drinks – will require agreement among teams to do this, have to make sure everyone is aware. | Could be raised at team meeting to agree with reasons behind it provided. Business Development have a team coffee break once per week so could be discussed then. | Chief Exec to send email Researcher to write email templates (share with those involved in organising package for comment) |
| Seek out staff at their desk rather than email or phone – open door (linked to action above) (Intra & Org) | “Walk, talk, email” slogan Put out on stop-press, encourage staff to set location, so can easily check where a colleague is before going to see them | Day 1, week 1 – to continue for 12 weeks | Support and encouragement, setting an example | Hot-desking – locating staff might be a wasted trip Staff expecting a colleague to help them immediately if turn up – might not be possible Need for audit trail | Staff encouraged to set location so colleagues know if in office Be mindful to check with colleagues that have time to talk If need record of discussion, ok to put | Email promoting this to come from Chief Exec (as above) |

| | | | | | | |
|--|--|---|--|--|---|---|
| | | | | | together a brief email highlighting key points | |
| Hold team meetings stood up or at least incorporate some standing time into meetings (Org) | All team leaders to inform staff of this new initiative If meetings are short e.g., less than 15 minutes – to have the whole meeting standing, if longer, ensure that some standing or moving time is incorporated into the agenda. Encourage walking 1:1s | Day 1, week 1 – to continue for 12 weeks | Management support, team leaders to initiate | Some staff may not be able to stand for prolonged periods Difficult to take notes during meetings when stood-up | Do not enforce, just make it optional, but encourage everyone that can to stand for short periods at least If need to take some notes, sit for short periods | Team leaders to initiate Directive to come from Chief Exec / senior management |
| Personal targets for steps/day and track activity using FitBit / pedometers and record steps each day (Intra & Inter) | Individuals to set their own personal targets for steps per day and share with team / colleagues (maybe write on a white board, or a sheet pinned to the wall) – emphasis on personal achievements rather than competing with each other | Day 1, week 2 & every other week after that | Management support and encouragement required and also support from team leader | Not everyone may want to participate | Could involve those who are less interested in tracking steps by get them to stand and update the board / sheet with everyone's steps | Teams to initiate this |
| Celebrate changes / achievements – tell us your sit less stories (Inter & Org) | Personal stories of things you / your team are doing on Yammer – could set-up a new group that encourages and celebrates successes Include a hashtag - #sitlessSYHA | Day 1, week 3 & every other week after that | Would be helpful for manager / leadership to share their stories – gives permission / buy-in | Not everyone looks at Yammer Time | Talking about it in team meetings and agreeing who can share what Group activities booking in advance in staff's diaries Friendly competitions between teams / colleagues | All share stories and coordinate own Yammer posts. Marketing/ Comms team to promote – DP to liaise |
| Lunchtime walking or running group (Inter) | Already a running group set-up – go 1 x week Could set-up a weekly walking group – would need to plan some walking routes – do | Day 1, week 4 – to continue for 12 weeks | Management support and encouragement | Only one shower and lack of changing facilities may put staff off the running group | If put off by lack of changing facilities – could signpost those staff to the walking group instead | Need organisers of walking group to be set-up An SYHA running group has recently |

| | | | | | | |
|---|--|---------------------------------|---|---|---|---|
| | certain things on the walks e.g., look for wildlife These could all be advertised using Yammer or via news stories on the intranet | | | | | been set up by AP so link in with her |
| Clear office / desk (Intra, Org, Env) | Not keeping personal supply of stationary – have a team supply or use the stationary cupboard | Day 1, week 6 | Managers to implement and buy-in | Staff too “attached” to their own stationary Nowhere for a central stationary point to be put No one takes responsibility for central point so staff don’t use and revert back to own supply | Find a place where stationary is easily accessed for all the team Encourage staff to take responsibility for replacing items | Team leaders to initiate this Need some directive from Chief Exec |
| Changes in policies and guidelines (Org) | Include something into the core brief about SYHA’s awareness that prolonged sitting is bad for your health and the importance of taking regular breaks and a summary of the initiatives that have been put in place (i.e., this document) – could make it a working document which evolves over time | Throughout 12-week period | Management would need to approve this | | | DP to liaise with Tim Gallimore to discuss this with as he looks at behaviours and culture change. |

Table 3: List of detailed actions for the local authority

| Action | Content | Timing | Management involvement | Barriers | How to overcome barriers | Who to action |
|--|---|--|---|--|--|---|
| Encourage staff to sit less / move more using a variety | Group together a range of sit less/move more ideas which will be communicated with staff via: email from Chief Exec in her weekly blog; provide | Day 1, week 1 and weekly after that | Chief Exec will need to approve these communications | Concerns that middle management may not support this. | To be discussed in team meetings to highlight what is happening and why | Researcher to draft email template to be sent |

| | | | | | | |
|---|---|---|--|---|---|---|
| <p>of different forms of comms (Intra, Org, Env)</p> | <p>a link to webpage (via comms team); further email prompts from Chief Exec.</p> <p>Sit less/move more ideas to be split into those that can be done in break/own times and those that can be done during non-break times.</p> <p>Break/own time ideas include: taking part in exercise classes / Pilates, active travel to work, lunchtime walk, play table tennis in the atrium, participate in walking/running group (already exists), “informal office sports” e.g., tea bag darts. Non-break time ideas include: talk not email, book meeting rooms on a floor you don’t work on, stairs instead of lift, download app to remind you to get up every hour (need to recommend an app), walk to any local meetings, use standing desks for work or meetings (need to highlight where these are), drink more water, stretches (need to recommend stretches).</p> <p>Also, to be included in communications – awareness raising about the health benefits of sitting less and moving more e.g., stress relief.</p> <p>A link to these messages to remain at the end of the weekly blog for the entire 12-weeks.</p> | | | <p>Those on remote sites across the borough may be excluded.</p> <p>Emails that are telling you what to do may put some people off.</p> | <p>Messages to be sent from Directors of each Directorate – to be reviewed at Directors meeting and an email to be sent addressing middle managers.</p> <p>Extra effort will be required to communicate message to those on remote sites across the borough.</p> <p>Ensure the emails are worded to make it clear these were ideas that came from a group of colleagues – so staff know it is bottom-up rather than top-down.</p> | <p>Researcher to contact Chief Exec and Comms team to discuss how to disseminate information (flag up issue of including those on remote sites)</p> <p>Researcher to liaise with Occupational Health / physio re. stretches</p> |
| <p>Team step competition (Inter)</p> | <p>To be undertaken within teams – but focus more on individual improvements and rather than who can do the most, so you’re competing with yourself rather than each other.</p> <p>Use iPhones, FitBits, pedometers (if available) to monitor steps.</p> <p>Winner every 4 weeks – biggest improver week-on-week (3 x during 12-week period)</p> <p>Will need champions in each team to ensure this happens</p> | <p>Day 1, week 1 – to continue for 12 weeks</p> | <p>Approval to run this will be required</p> <p>Need to set-up as teams – would require a simple spreadsheet</p> | <p>Not everyone will have the available technology (iPhone, FitBit)</p> | <p>Check with Public Health to see if they have some leftover pedometers from a previous challenge.</p> | <p>Individual teams – would need champions in each team to action this</p> |

| | | | | | | |
|--|--|--|---|---|---|--|
| Hold team meetings stood up or incorporate some standing time into meetings (Org) | All team leaders to inform staff of this new initiative If meetings are short e.g., less than 15 minutes – to have the whole meeting standing, if longer to ensure that some standing or moving time is incorporated into the agenda | Day 1, week 1 – to continue for 12 weeks | Directors support, team leaders to initiate | Some people may not be able to stand for prolonged periods | Do not enforce, just make it optional, but encourage everyone that can to stand for short periods at least | Directors disseminate at Full Area Manager meetings, then message relayed to team leaders in local management meetings |
| Include improving health and wellbeing in 1:1s (Org) | To have as standard some question relating to how to improve health and wellbeing at work with particular reference to sitting less and moving more. | Day 1, week 1 – to continue for the 12 weeks | Approval from Chief Exec and HR | Managers may need training or will at least need to be made aware of this | HR to provide advice on information managers would need to successfully complete this in the 1:1 | Researcher to liaise with Chief Exec and HR (who create the basic framework) |
| Include sitting less / moving more into workplace guidelines (Org) | Include information relating to sitting less / moving more at work in local workplace health and wellbeing guidance, acknowledging that local authority is aware that prolonged sitting is bad for health and therefore the importance of taking regular breaks and a summary of the initiatives that have been put in place (i.e., this document) | Day 1, week 1 – to continue for the 12 weeks | Approval from Chief Exec, HR and/or Occupational Health | Would need HR and/or Occupational Health approval and involvement – may not have time/be a priority | Need to liaise with HR and Occupational Health to discuss | Researcher to liaise with HR, Occupational Health and Chief Exec |
| Team standing breaks (Inter) | Every hour, whole team stands for 2-5 mins and stretches (need to provide recommended stretches). Will need to have a champion / series of champions in each team to lead this and ensure it happens | Day 1, week 3 – to continue for 12 weeks | Approval to run this will be required | Health and Safety Time / work pressures | Link in with occupational health and physio Schedule into diaries, team leader to support this so all staff feel able to participate – need a champion in each team | Individual teams – would need champions in each team to action this Researcher to liaise with Occupational Health / physio re. stretches |
| *Message over tannoy to remind | Message over tannoy e.g., “Hi di hi” which is the prompt to remind everyone to stand-up and move. To occur every Tuesday at 11am. | Day 2, week 4, then | Approval from Chief Exec | Some may not want to join in as | That’s ok, it should be optional | Researcher to liaise with Facilities |

| | | | | | | |
|---------------------------------------|--|-------------------|--|--------------------|--|---------------------------|
| everyone to stand / move (Org) | | weekly after that | | too busy / no time | | Management and Chief Exec |
|---------------------------------------|--|-------------------|--|--------------------|--|---------------------------|

*This was the idea that was deemed unfeasible by the implementation team so was removed from the final action plan

Table 4: List of detailed actions for the large corporation

| Action | Content | Timing | Management involvement | Barriers | How to overcome barriers | Who to action |
|--|---|--|---|---|--|---|
| Weekly email from Area Manager with sit less suggestions (Intra, Inter & Org) | Area Manager to send an email informing team of challenge and importance of sitting less at work. Suggestions on how to sit less to be included in the email: taking the stairs not the lift; if have a FitBit – make sure you do at least 250 steps/hour and make use of prompts (vibration) it makes to do this; drink more water; stand/walk for calls; make use of the coffee app and go get your free daily coffee from Valerie Patisserie – especially on a Friday (when everyone is expected to be in the office) everyone could go together – social element. | Day 1, week 1 and then a weekly email thereafter | Area Manager to send email (template to be written by Researcher) | How to get everyone involved | Use team WhatsApp group to encourage Use weekly call on a Monday to prompt/remind | Researcher to write email templates for each week TA/EG to check Area Manager happy to send email and encourage participation in weekly meetings |
| Weekly sit less challenge (Inter & Org) | Use the white board next to Area Manager’s desk to track everyone’s steps (use FitBits or iPhones for step counts) – make it competition with yourself rather than each other – prize for biggest improver rather than who’s got most steps. | Day 1, week 2 | Approval required from Area Manager | How to get everyone involved | Use team WhatsApp group to encourage Use weekly call on a Monday to prompt/remind | TA/EG to get Area Manager approval and set-up & maintain white board progress chart Need to decide on prize ?extra holiday days |
| Incorporate activity into monthly team meetings | The use of energisers, movement, “treasure hunts” and/or challenges to add activity into meetings. | Three times during the 12 weeks (at team meeting which | Area Manager would need to support this and put time in the | Busy agendas, sometimes have guests attending | Stream-line meetings, plan activity in, build it in to break times | TA/EG to approach Area Manager to see if happy to include activity into the team meetings |

| | | | | | | |
|--------------------------|---|----------------------|-----------------------|--|-----------------------------|--------------------------------------|
| (Inter & Org) | Every other meeting is in an external location – when in an external location, there could be a “treasure hunt” challenge included in the day where team members have to go out and find and take a photo of certain objects e.g., if somewhere with outside space, could take a picture of an insect – the most obscure the better. For external and internal meetings – could incorporate movement into the meeting e.g., coffee break – go and get free coffee from Patisserie Valerie, all team stand/walk on spot for 5 mins every hour etc, who can get the most steps in the lunch break? | occurs once a month) | agenda for activities | | e.g., lunch / coffee breaks | Area Manager to include into agendas |
|--------------------------|---|----------------------|-----------------------|--|-----------------------------|--------------------------------------|

NB: for all tables, the levels of influence each action related to is denoted as follows: “Intra” is intrapersonal, “Inter” is interpersonal, “Org” is organisational, and “Env” is environmental.

Appendix 10

a: Communication templates for each participating organisation

Weekly email templates from Managing Director (MD) of small business

Email 1 – to send on Monday 10th September 2018

Dear all,

So today marks the first day of the **“Sit Less at [small business]”** initiative, which will be running between now and the end of November. I’d like to encourage you all to engage with as many aspects of **“Sit Less at [small business]”** as you can.

Here are some activities you can do to get you started:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks – KF will put together a rota for all those keen to use the exercise ball

Also, NE has brought in a PS4 system, so feel free to pair up and have a go at some games that involve standing, moving or dancing. All you need to do is download a free app and your mobile can then be used as the control (ask NE for more details). We’ll make it into a competition over the next 4 weeks and there will be a prize for the winner!

We’ll also be sharing what we’re doing on our social media platforms using #sitless[small business] so feel free to get involved in that too, posting about any ways you are sitting less at work.

Sitting less and moving more at work may not only improve your health, but may also improve your productivity and concentration levels and make [small business] an even better place to work, so do make the most of these activities!

Best wishes, MD

Email 2 – to send out on Monday 17th September 2018

Dear all,

This is the second week of the initiative, **“Sit Less at [small business]”**. I hope you’ve all been enjoying sitting less and moving more at work so far!

If you haven’t already, try some of the following activities this week to sit less and move more:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair –start with just an hour at a time and build it up over the weeks – KF will put together a rota for all those keen to use the exercise ball
- ✓ Walk to the shops for lunch or snacks – KF will put together a rota for those interested in taking part

- ✓ Do some exercises with the office dumbbells – ask FG for advice on this one!

Remember to use #sitless[small business] if you want to share what you're doing on social media.

Keep sitting less and moving more!

Best wishes, MD

Email 3 – to send out on Monday 24th September 2018

Dear all,

We're now into week 3 of the **"Sit Less at [small business]"** initiative. I hope you've all been enjoying sitting less and moving more at work so far!

Keep experimenting with these activities to sit less and move more:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Try using the wireless headsets and get up and walk when on the phone

There's still time to join the computer game competition! If you're not into competition, why not try standing scoring instead so you can still get involved?

Remember to use #sitless[small business] if you want to share what you're doing on social media.

Keep sitting less and moving more!

Best wishes, MD

Email 4 – to send out on Monday 1st October 2018

Dear all,

We're now into week 4 of **"Sit Less at [small business]"**. I hope you're still having fun with sitting less and moving more at work.

As always, keep experimenting with these activities to sit less and move more:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Walk to the shops for lunch or snacks
- ✓ Do some exercises with the office dumbbells – ask FG for advice on this one!
- ✓ Try using the wireless headsets and get up and walk when on the phone

This is the last week of the computer games competition – there is still time to get involved and there is a prize for the winner! If you're not into competition, why not try standing scoring instead so you can still get involved?

Remember to use #sitless[small business] if you want to share what you're doing on social media.

Keep sitting less and moving more!

Best wishes, MD

Email 5 – to send out on Monday 8th October 2018

Dear all,

This is the 5th week of **“Sit Less at [small business]”**. Today, I'd like to start off by announcing that the winner of the computer games competition is xxx and he/she has won xxx! Well done!

Our next 4-week competition is the ping pong competition. Again, pair up and compete for the best of three shots – the person who wins the most points will get a prize! If you're not into competition, why not try standing scoring instead so you can still get involved?

As always, to sit less and move more you can also:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Try using the wireless headsets and get up and walk when on the phone

Remember to use #sitless[small business] if you want to share what you're doing on social media.

The main message is, keep sitting less and moving more!

Best wishes, MD

Email 6 – to send out on Monday 15th October 2018

Dear all,

We're about to start week 6 of the **“Sit Less at [small business]”** initiative. I hope you're still enjoying sitting less and moving more at work – keep up the good work!

Keep experimenting with the following:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Walk to the shops for lunch or snacks
- ✓ Do some exercises with the office dumbbells – ask FG for advice on this one!
- ✓ Try using the wireless headsets and get up and walk when on the phone

Remember to use #sitless[small business] if you want to share what you're doing on social media.

The main message is, keep sitting less and moving more!

Best wishes, MD

Email 7 – to send out on Monday 22nd October 2018

Dear all,

We're now over halfway through **"Sit Less at [small business]"** and there's still lots you can do to get involved.

Here's a reminder of the activities you can get involved in:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Try using the wireless headsets and get up and walk when on the phone

There's also still time to get involved in the ping pong competition!

Remember to use #sitless[small business] if you want to share what you're doing on social media.

Keep sitting less and moving more!

Best wishes, MD

Email 8 – to send out on Monday 29th October 2018

Dear all,

We're about to start week 8 of the **"Sit Less at [small business]"** initiative

Keep experimenting with the following:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Walk to the shops for lunch or snacks
- ✓ Do some exercises with the office dumbbells – ask FG for advice on this one!
- ✓ Try using the wireless headsets and get up and walk when on the phone

This is the last week of the ping pong competition – there is still time to get involved and there is a prize for the winner! If you're not into competition, why not try standing scoring instead so you can still get involved?

Remember to use #sitless[small business] if you want to share what you're doing on social media.

The main message is, keep sitting less and moving more!

Best wishes, MD

Email 9 – to send out on Monday 5th November 2018

Dear all,

We're about to start week 9 of the **"Sit Less at [small business]"** initiative which means it's time to announce the winner of the ping pong competition... The winner is [xxx] and [he/she] has won [xxx]! Well done!

Our final 4-week competition as part of “**Sit Less at [small business]**” is the press-up competition. The focus here is on the biggest improver rather than the person that can do the most – so everyone can be in it to win it! As always, there will be a prize at the end for the winner.

Here’s a reminder of the activities you can get involved in:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Try using the wireless headsets and get up and walk when on the phone

Remember to use #sitless[small business] if you want to share what you’re doing on social media.

Keep sitting less and moving more!

Best wishes, MD

Email 10 – to send out on Monday 12th November 2018

Dear all,

We’re into week 10 of the “**Sit Less at [small business]**” initiative. I hope you’re still enjoying sitting less and moving more at work – keep up the good work!

Keep experimenting with the following:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Walk to the shops for lunch or snacks
- ✓ Do some exercises with the office dumbbells – ask FG for advice on this one!
- ✓ Try using the wireless headsets and get up and walk when on the phone

Remember to use #sitless[small business] if you want to share what you’re doing on social media.

The main message is, keep sitting less and moving more!

Best wishes, MD

Email 11 – to send out on Monday 19th November 2018

Dear all,

We’re now into the final couple of weeks of “**Sit Less at [small business]**”. There’s still lots you can do to get involved, including:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Try using the wireless headsets and get up and walk when on the phone

There's also still time to get involved in the press-up competition!

Remember to use #sitless[small business] if you want to share what you're doing on social media.

Keep sitting less and moving more!

Best wishes, MD

Email 12 – to send out on Monday 26th November 2018

Dear all,

We're now into the final week of **"Sit Less at [small business]"**. However, just because the formal initiative is coming to an end, doesn't mean you have to stop sitting less and moving more. Keep up with the changes that you've made and keep experimenting with new ones.

Here's a final reminder of the sorts of things you can do:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour – speak to NE who has developed a pop-up reminder which can be installed to your computers
- ✓ Use the exercise ball instead of your chair – aim for 2-3 times per week, start with just an hour at a time and build it up over the weeks
- ✓ Get involved in the press-up competition
- ✓ Walk to the shops for lunch or snacks
- ✓ Do some exercises with the office dumbbells – ask FG for advice on this one!
- ✓ Try using the wireless headsets and get up and walk when on the phone

This is the last week of the press-up competition – there is still time to get involved and there is a prize for the winner! If you're not into competition, why not try standing scoring instead so you can still get involved?

Remember to use #sitless[small business] if you want to share what you're doing on social media.

I hope you've enjoyed sitting less and moving more at work, now we just need to keep it up!

Best wishes, MD

Email 13 – to send out on Monday 3rd December 2018

Dear all,

The **"Sit Less at [small business]"** initiative has now formally come to an end, but I'd like to use this opportunity to emphasise that you have my support to keep going with any of the activities that you have enjoyed over the last 12 weeks in order to keep you sitting less and moving more at work.

Also, I must announce the winner of the final competition, the biggest improver in the number of press-ups achieved is... [xxx] and [he/she] has won [xxx]! Well done!

I hope you've enjoyed sitting less and moving more at work, now we just need to keep it up!

Best wishes, MD

Initial Email

Dear all,

I am writing to highlight to you a new initiative, **“Sit Less at [Charity]”**, that will be running over the next 12 weeks. This initiative is part of a University of Sheffield PhD project to encourage staff to sit less and move more at work. There are a variety of elements to the initiative which you will notice over the coming weeks and all of these elements were developed with the help of a group of [Charity] staff volunteers. I would like to encourage you all to engage with as many aspects of **“Sit Less at [Charity]”** as you can.

Here are some top tips to sit less and move more at work:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour
- ✓ Make your own drinks
- ✓ Drink more water
- ✓ “Walk, talk, then email” – go to talk to colleagues first rather than email, send a brief follow-up email afterwards if required
- ✓ Have your lunch away from your desk and/or go for a lunchtime walk
- ✓ Have walking or standing meetings

Sitting less and moving more at work may not only improve your health, but may also improve your productivity and concentration levels and make [Charity] an even better place to work.

Best wishes, Chief exec

Email 2

Dear all,

This is the second week of the initiative, **“Sit Less at [Charity]”**. I hope you’ve all been enjoying sitting less and moving more at work so far!

Keep trying some of these top tips to sit less and move more at work:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour
- ✓ Make your own drinks
- ✓ Drink more water
- ✓ “Walk, talk, then email” – go to talk to colleagues first rather than email, send a brief follow-up email afterwards if required
- ✓ Have your lunch away from your desk and/or go for a lunchtime walk
- ✓ Have walking or standing meetings

If you have a FitBit device (or similar), pedometer or a phone that allows you to track steps, you might also choose to take part in a team step challenge – Comms will provide more information about in due course.

In the meantime, keep sitting less and moving more!

Best wishes, Chief exec

Email 3

Dear all,

This is the third week of the initiative, **“Sit Less at [Charity]”**. I hope you’ve all been enjoying sitting less and moving more at work so far!

Why not share your sit less stories on Yammer using the hashtag #sitless[Charity]? You might just inspire others to make some positive changes too.

Keep experimenting with these top tips to sit less and move more at work:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour
- ✓ Make your own drinks
- ✓ Drink more water
- ✓ “Walk, talk, then email” – go to talk to colleagues first rather than email, send a brief follow-up email afterwards if required
- ✓ Have your lunch away from your desk and/or go for a lunchtime walk
- ✓ Have walking or standing meetings

Keep sitting less and moving more!

Best wishes, Chief exec

Email 4

Dear all,

We’re now into week 4 of **“Sit Less at [Charity]”**. I hope you’re still having fun with sitting less and moving more at work.

This week, why not try joining the lunchtime running club (contact AP [insert email] if interested). If running is not your thing, then how about setting up a lunchtime walking or cycling club?

As always, keep experimenting with these top tips to sit less and move more at work:

- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour
- ✓ Make your own drinks
- ✓ Drink more water
- ✓ “Walk, talk, then email” – go to talk to colleagues first rather than email, send a brief follow-up email afterwards if required
- ✓ Have your lunch away from your desk and/or go for a lunchtime walk
- ✓ Have walking or standing meetings

Keep sitting less and moving more!

Best wishes, Chief exec

Email 5 (to go out week 6)

Dear all,

It’s now week 6 of **“Sit Less at [Charity]”**. Here’s a reminder of the things you can get involved with:

- ✓ Team step challenge

- ✓ Joining the lunchtime running club (contact AP [insert email] if interested) or set-up your own walking or cycling group
- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour
- ✓ Make your own drinks
- ✓ Drink more water
- ✓ “Walk, talk, then email” – go to talk to colleagues first rather than email, send a brief follow-up email afterwards if required
- ✓ Have your lunch away from your desk and/or go for a lunchtime walk
- ✓ Have walking or standing meetings

And don't forget to keep sharing your sit less stories on Yammer, using the hashtag #sitless[Charity].

The main message is, keep sitting less and moving more!

Best wishes, Chief exec

Email 6 (to go out week 8)

We're now well over halfway through the “**Sit Less at [Charity]**” initiative. I hope you're still enjoying sitting less and moving more at work – keep up the good work!

Keep experimenting with the following:

- ✓ Team step challenge
- ✓ Joining the lunchtime running club (contact AP [insert email] if interested) or set-up your own walking or cycling group
- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour
- ✓ Make your own drinks
- ✓ Drink more water
- ✓ “Walk, talk, then email” – go to talk to colleagues first rather than email, send a brief follow-up email afterwards if required
- ✓ Have your lunch away from your desk and/or go for a lunchtime walk
- ✓ Have walking or standing meetings

And don't forget to keep sharing your sit less stories on Yammer, using the hashtag #sitless[Charity].

The main message is, keep sitting less and moving more!

Best wishes, Chief exec

Email 7 (to go out week 10)

Dear all,

We're now into week 10 of “**Sit Less at [Charity]**”. There's still lots you can do to get involved. Here's a reminder of the things you can do:

- ✓ Take part in a team step challenge
- ✓ Join the lunchtime running club (contact AP [insert email] if interested) or set-up your own walking or cycling group
- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour
- ✓ Make your own drinks

- ✓ Drink more water
- ✓ “Walk, talk, then email” – go to talk to colleagues first rather than email, send a brief follow-up email afterwards if required
- ✓ Have your lunch away from your desk and/or go for a lunchtime walk
- ✓ Have walking or standing meetings

And don't forget to keep sharing your sit less stories on Yammer, using the hashtag #sitless[Charity].

Keep sitting less and moving more!

Best wishes, Chief exec

Email 8 (to go out week 12)

Dear all,

We're now into the final week of **“Sit Less at [Charity]”**. However, just because the formal initiative is coming to an end, doesn't mean you have to stop sitting less and moving more at work. Keep up with the changes that you've made and keep experimenting with new ones. Here's a final reminder of the sorts of things you can do:

- ✓ Take part in a team step challenge
- ✓ Join the lunchtime running club (contact AP [insert email] if interested) or set-up your own walking or cycling group
- ✓ Take short, regular breaks from your desk e.g., 2-5 minutes every hour
- ✓ Make your own drinks
- ✓ Drink more water
- ✓ “Walk, talk, then email” – go to talk to colleagues first rather than email, send a brief follow-up email afterwards if required
- ✓ Have your lunch away from your desk and/or go for a lunchtime walk
- ✓ Have walking or standing meetings

Remember to also keep sharing your sit less stories on Yammer, using the hashtag #sitless[Charity].

I hope you've enjoyed sitting less and moving more at work, now we just need to keep it up!

Best wishes, Chief exec

[Templates for General Communications for the Charity](#)

To be included in Managers Briefing

[Charity name] has been participating in a research project with a PhD student at the University of Sheffield. The aim of this project is to encourage and support staff to sit less and move more at work. This has many potential benefits including improving physical and mental health and wellbeing and also improving productivity, concentration and energy levels.

As part of this research project, a group of [Charity] staff volunteers have developed a package of changes (with support from the PhD student) called **“Sit Less at [Charity]”** which is being rolled out at [Charity] (targeting desk-based staff only) for 12 weeks from the week beginning 24th September 2018.

There are a variety of elements to this package which can be found in the attached action plan and detailed summary of actions. There are a few specific actions that will require your support and encouragement. These include:

- Supporting the idea of “Walk, talk, then email” – i.e., going to speak to a colleague first, rather than email
- Holding team meetings stood up (or incorporating some standing/moving into meetings)
- Promoting the clear office/desk policy
- Organising team step challenges – where individuals set their own step targets each day and communicate that with the rest of the team (maybe write it up on a white board or a sheet pinned to the wall). The emphasis here is on personal improvements rather than who has managed the most steps – the biggest improver can “win”. These challenges could be carried out every other week during the 12-week period.

During this time, staff will be receiving emails from [Chief exec] encouraging regular short breaks from their desks (2-5 minutes every hour) – this is also something that will require your support.

To be included in the Core Briefing

[Charity name] has been participating in a research project with a PhD student at the University of Sheffield. The aim of this project is to encourage and support staff to sit less and move more at work. This has many potential benefits including improving physical and mental health and wellbeing and also improving productivity, concentration and energy levels.

As part of this research project, a group of [Charity name] staff volunteers have developed a package of changes (with support from the PhD student) called “**Sit Less at [Charity]**” which is being rolled out at [Charity name] (targeting desk-based staff only) for 12 weeks from the week beginning 24th September 2018.

There are a variety of elements to this package, all of which have the support of the Senior Management and Team Leaders. You are encouraged to participate in as many aspects of “**Sit Less at [Charity]**” as you’d like. The elements include:

- ✓ Taking part in a team step challenge (see below for details)
- ✓ Joining the lunchtime running club (contact AP [insert email] if interested) or set-up your own walking or cycling group
- ✓ Taking short, regular breaks from your desk e.g., 2-5 minutes every hour
- ✓ Making your own drinks
- ✓ Drinking more water
- ✓ Using the slogan “Walk, talk, then email” – go to talk to colleagues first rather than email, send a brief follow-up email afterwards if required
- ✓ Having your lunch away from your desk and/or go for a lunchtime walk
- ✓ Having walking or standing meetings
- ✓ Sharing your sit less stories on Yammer using the hashtag #sitless[Charity name]

The team step challenge

This is for anyone who has a FitBit (or similar device), pedometer, or a phone that has the ability to track steps. The idea of this is that individuals set their own step targets each day and communicate that with the rest of the team (maybe write it up on a white board or a sheet pinned to the wall). The emphasis here is on personal improvements rather than who has managed the most steps – the biggest improver can “win”. These

challenges could be carried out as frequently as you like over the 12-week period, but every other week would be recommended.

Weekly blog templates from Chief Executive of local authority

Blog 1

Dear all,

I am writing to highlight to you a new initiative, **“Sit Less at [Local authority]”**, that will be running over the next 12 weeks. This initiative is part of a University of Sheffield PhD project to encourage staff to sit less and move more at work. There are a variety of elements to the initiative which you will notice over the coming weeks and all of these elements were developed with the help of a group of Doncaster Council staff volunteers. I would like to encourage you all to engage with as many aspects of **“Sit Less at [Local authority]”** as you can and below are some top tips to sit less and move more at work.

Things you could do in your breaks or your own time include:

- ✓ Take part in exercise classes or Pilates which are put on by Doncaster Council for staff [insert link to intranet webpages if appropriate]
- ✓ Try active travel to work – walking or cycling even just part of the way
- ✓ Go for a lunchtime walk
- ✓ Find a partner and play table tennis in the atrium
- ✓ Try joining the staff walking and running groups [insert link to existing groups if appropriate]
- ✓ Try some “informal office sports” e.g., tea bag darts (go with a few of your team to make a drink and see who can throw their tea bag in a cup from a distance).

Things that you could do as part of your working time include:

- ✓ Go to talk to colleagues first rather than email
- ✓ Book meeting rooms on a different floor
- ✓ Use the stairs instead of the lift
- ✓ Download an app to remind you to get up every hour e.g., Marinara Timer (<https://www.marinaratimer.com/>)
- ✓ Walk to any local meetings
- ✓ Make use of the bank of standing desks on each floor in the Civic Office
- ✓ Drink more water
- ✓ Do some stretches whilst waiting for your printing or the photocopier [need to link in here to the work KO is doing].

Sitting less and moving more at work may not only improve your health including reducing your risk of heart disease, diabetes, but may also improve your productivity and concentration levels and make [Local authority] an even better place to work.

Best wishes, Chief exec

Blog 2

Dear all,

This is the second week of the initiative, **“Sit Less at [Local authority]”**. I hope you’ve all been enjoying sitting less and moving more at work so far!

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

We’ve also started some team step challenges, so ask your team leader about this and feel free to take part.

In the meantime, keep sitting less and moving more!

Best wishes, Chief exec

Blog 3

Dear all,

This is the third week of the initiative, **“Sit Less at [Local authority]”**. I hope you’ve all been enjoying sitting less and moving more at work so far!

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don’t forget the team step challenge which you can get involved in. Why not also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour?

Keep sitting less and moving more!

Best wishes, Chief exec

Blog 4

Dear all,

We’re now into week 4 of **“Sit Less at [Local authority]”**. I hope you’re still having fun with sitting less and moving more at work.

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don’t forget the team step challenge which you can get involved in and you can also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour.

Keep sitting less and moving more!

Best wishes, Chief exec

Blog 5

Dear all,

It’s now week 5 of **“Sit Less at [Local authority]”**. Here’s a reminder of the things you can get involved with:

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don't forget the team step challenge which you can get involved in and you can also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour.

The main message is, keep sitting less and moving more!

Best wishes, Chief exec

Blog 6

Dear all,

We're about to start week 6 of the **"Sit Less at [Local authority]"** initiative. I hope you're still enjoying sitting less and moving more at work – keep up the good work!

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don't forget the team step challenge which you can get involved in and you can also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour.

The main message is, keep sitting less and moving more!

Best wishes, Chief exec

Blog 7

Dear all,

We're now over halfway through **"Sit Less at [Local authority]"** and there's still lots you can do to get involved.

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don't forget the team step challenge which you can get involved in and you can also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour.

Keep sitting less and moving more!

Best wishes, Chief exec

Blog 8

Dear all,

We're about to start week 8 of the **"Sit Less at [Local authority]"** initiative

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don't forget the team step challenge which you can get involved in and you can also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour.

The main message is, keep sitting less and moving more!

Best wishes, Chief exec

Blog 9

Dear all,

We're about to start week 9 of the **"Sit Less at [Local authority]"** initiative and there's still lots you can do to get involved.

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don't forget the team step challenge which you can get involved in and you can also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour.

Keep sitting less and moving more!

Best wishes, Chief exec

Blog 10

Dear all,

We're into week 10 of the **"Sit Less at [Local authority]"** initiative. I hope you're still enjoying sitting less and moving more at work – keep up the good work!

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don't forget the team step challenge which you can get involved in and you can also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour.

The main message is, keep sitting less and moving more!

Best wishes, Chief exec

Blog 11

Dear all,

We're now into the final couple of weeks of **"Sit Less at [Local authority]"** and there's still lots you can do to get involved.

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don't forget the team step challenge which you can get involved in and you can also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour.

Keep sitting less and moving more!

Best wishes, Chief exec

Blog 12

Dear all,

We're now into the final week of **"Sit Less at [Local authority]"**. However, just because the formal initiative is coming to an end, doesn't mean you have to stop sitting less and moving more. Keep up with the changes that you've made and keep experimenting with new ones.

Please click here [link to Blog 1 post rather than repeating content] for ideas of what you can do both in your break time and during your work time to sit less and move more at work.

Don't forget the team step challenge which you can get involved in and you can also try team standing breaks where you and your team stands or moves for 2-5 minutes every hour.

I hope you've enjoyed sitting less and moving more at work, now we just need to keep up this great work!

Best wishes, Chief exec

Blog 13

Dear all,

The **"Sit Less at [Local authority]"** initiative has now formally come to an end, but I'd like to use this opportunity to emphasise that you have my support to keep going with any of the activities that you have enjoyed over the last 12 weeks in order to keep you sitting less and moving more at work.

I hope you've enjoyed sitting less and moving more at work, now we just need to keep up all this great work!

Best wishes, Chief exec

b: Briefing note for Directors meeting at local authority

Re: Gaining management support for “Sit Less at [Local Authority]”, a PhD project to encourage staff to sit less and move more at work

Background

Sitting for long periods is linked to higher risks of health problems such as heart disease, diabetes, obesity, depression, and neck/back problems. Prolonged sitting may be a particular problem in the workplace where many workers now sit in desk-based jobs for an average of six hours a day. There is a need to develop and test interventions to encourage staff to sit less at work and see how this may work in practice in a range of different types of organisations.

Dr Kelly Mackenzie [Researcher], a PhD student and Public Health Registrar from the School of Health and Related Research (ScHARR) at the University of Sheffield, is conducting research funded by a Fellowship with the National Institute for Health Research (NIHR), looking at “Sit Less at Work” interventions. This project began in October 2016 is being conducted in four different organisations across South Yorkshire and, after liaising with the Public Health team, [Local Authority] was selected as one of the participating organisations.

The Project Plan

There are three phases to this project:

- **Phase 1** was conducted in [LOCAL AUTHORITY] in August 2017 and comprised of three focus groups which aimed to understand the barriers and enablers to sitting less at work.
- **Phase 2** was conducted in May 2018 and used the idea of co-design with a group of ten [LOCAL AUTHORITY] staff volunteers to develop a low-cost intervention, “Sit Less at [LOCAL AUTHORITY]” (see Appendix 1 for a description of the various elements of the final intervention).
- **Phase 3** aims to now implement and test “Sit Less at [LOCAL AUTHORITY]” over a 12-week period from 29th October 2018 to 25th January 2019 (see Appendix 2 for a weekly summary of the 12-week intervention period) to see if it results in a decrease in sitting time at work and to understand why it may or may not have worked. The overall aim of the implementation of “Sit Less at [LOCAL AUTHORITY]” is to have as little researcher involvement as possible to understand how this process may be replicated other organisations when there is no researcher present. However, to establish the effects of the intervention, Researcher will be obtaining before and after measurements of sitting time, collecting data from a series of questionnaires relating to general lifestyle, health and wellbeing and work-related measures (e.g., self-reported productivity and sickness absence), and conducting focus groups/interviews with staff and managers.

Support Required

Directors input is now required to support the implementation of “Sit Less at [LOCAL AUTHORITY]” (Phase 3). Based on the action plan developed by [LOCAL AUTHORITY] staff during Phase 2 of the project, specific support before and/or during the 12-week intervention period will need to be as follows:

1. Dissemination of weekly emails (drafted by Researcher) from Senior Management/Chief Executive encouraging staff to sit less at work
2. Information to be sent from Senior Management to all team managers to consider
 - a. Running team step challenges


- b. Holding “stand-up” team meetings (or incorporating some periods of standing into team meetings)
 - c. Having team “standing breaks” where the whole team stands and/or stretches for 2-5 minutes every hour
3. Human Resources/Occupational Health to include questions relating to improving health and wellbeing (with particular reference to how to sit less and move more at work) within 1:1 template
4. Human Resources/Occupational Health to develop workplace health and wellbeing guidance acknowledging that [LOCAL AUTHORITY] is aware that prolonged sitting is bad for health and therefore the importance of taking regular breaks and a summary of the initiatives that have been put in place (i.e., the “Sit Less at [LOCAL AUTHORITY]” intervention)
5. Facilities Management to put a message over the tannoy every Tuesday at 11am (or another convenient time) during the 12-week intervention period to remind staff to stand-up and/or move.

If there are existing or upcoming initiatives that “Sit Less at [LOCAL AUTHORITY]” could tap into/piggy-back onto then this would be encouraged as it complements the “real-world” nature of this project.

Project Completion

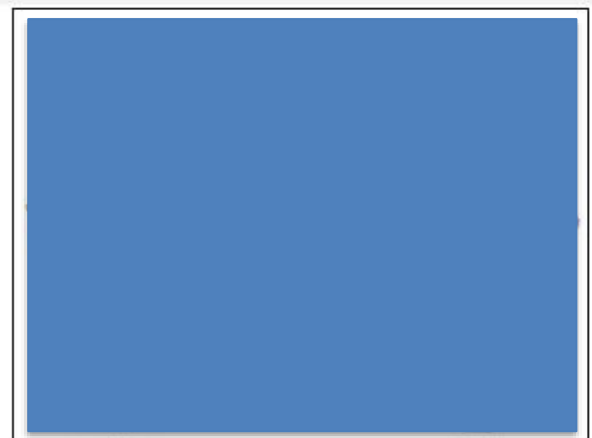

Once the project is complete, Researcher will share findings with [LOCAL AUTHORITY] (as a report and/or presentation) as there may be elements of the intervention that worked well that you may wish to formally embed within your organisation. Researcher also intends to publish findings from all four of the participating organisations in academic peer-reviewed journals and at academic conferences. In these reports/presentations, none of the participating organisations will be formally named.

c: "Sit Less at Work" presentation at local authority



**SIT LESS
AT WORK.**

Dr Kelly Mackenzie
PhD Student & Public Health Registrar
University of Sheffield

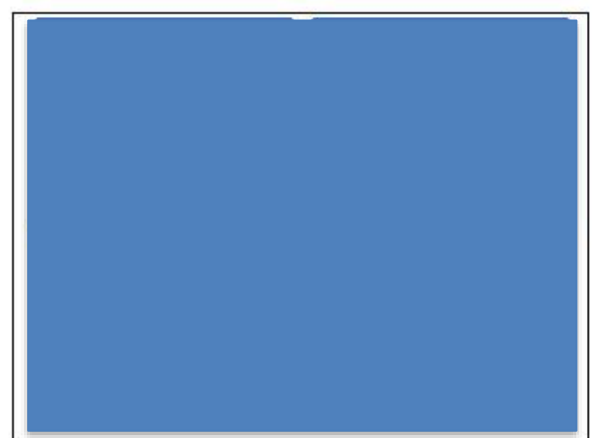


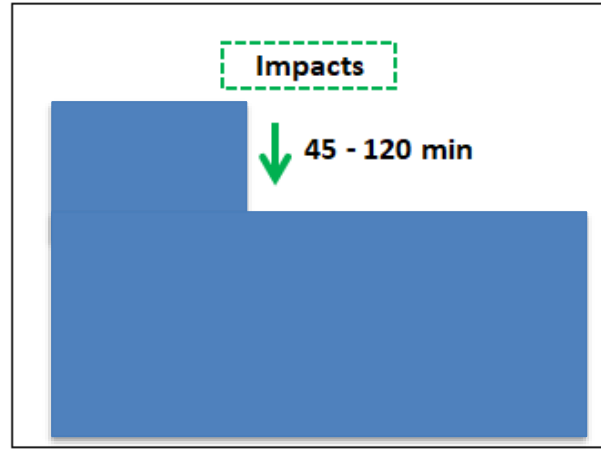
**Workplaces: a key setting
to target**



Aims of my PhD Project

1. To develop, implement & evaluate low-cost interventions to help staff to sit less at work in four different organisations
2. To explore the differences of intervention development, implementation & evaluation in the different organisations





Action Plan

Implementation

- Aim is that I have limited involvement
 - I'm looking at whether the process of developing and implementing is something that could occur outside of a research setting
- Staff have developed the action plan, but given the size of this organisation, higher-level support is required to operationalise it

Support needed for...

1. Liaising with Chief Exec / Comms to discuss how to disseminate info re. encouraging staff to sit less / move more
2. Ensuring info is disseminated to team leaders re. the whole initiative and also various elements including:
 - a) Team step competition - team champion for this?
 - b) Hold team meetings stood up or incorporate some standing time into meetings
 - c) Team standing breaks
3. Incorporating health and wellbeing in 1:1s
4. Including sitting less / moving more into workplace guidelines
5. Message over tanoy to remind everyone to stand / move
6. Main Office staff only, or also those in remote sites?

Any questions?

Appendix 11: Feedback from Workshops 1 and 2 by organisation

Workshop 1 small business qualitative feedback from questionnaires

How did you find the workshop as a way of developing ideas for a package of changes to sit less in your organisation?

“Interesting, fun, thought provoking”

“Great, insightful, fun, some really interesting ideas”

“Useful as there were no boundaries to ideas, it is excellent to see that the team are all keen to improve the environment with moving more”

“Prompted ideas I hadn’t thought about through the different categories on the sheets”

“Very good, allowed us to think of more ideas”

“Very productive. We were able to come up with a lot of plausible ideas that we can implement into the organisation”

What was particularly good about the workshop / what went particularly well?

“Collaborative, fun, standing”

“Getting the team together and brainstorming”

“That we stood and walked in teams, was good fun and an excellent team building session”

“Made me stand up for an hour. Made me aware of how little I actually stand at work”

“Brainstorming allowed our imagination to run wild, also allowed us to suggest ideas to [MD]”

“I felt very involved in what was being said. Being split into smaller groups helped this greatly”

Was there anything that could have been improved?

“Not sure”

“Cake”

“Nothing at all”

“Nothing I can think of”

“No”

“Electronic survey”

Any other comments or feedback:

“Looking forward to implementing”

“Enjoyable, thanks”

“Really good workshop, thank you”

“Really prompted thoughts very well”

“No”

“N/A”

1. Workshop 2 small business qualitative feedback from questionnaires

How did you find the workshop as a way of formulating a plan for a package of changes to sit less to be rolled-out in your organisation?

“very good as we now have a press up competition.”

“Good. Well-structured and easy to follow and contribute”

“Really useful as it is something that the team have agreed on together, they were suggestions from the majority of staff.”

“Helpful and insightful. It feels as we made real progress.”

Do you think the plan that has been developed could work in your organisation? Why / why not?

“Yes, as we have the press up competition.”

“Definitely yes. Mainly because management are on board. We recognise the issue.”

“I hope so, it's all great in theory, however with a lot of things it is reliant on everyone taking it seriously and sticking to what has been agreed.”

“Yes, it's been developed around our needs.”

Were barriers to roll-out addressed? If so, how?

“Not as of yet.”

“Yes. By discussion and consensus agreement.”

“Yeah, I believe so, I think we were realistic about the barriers and as in question 2 it is down to the team to commit to making it work.”

“Yes, agreement from [MD] to chuck some cash at this and allow employees time to take part.”

What was particularly good about the workshop / what went particularly well?

“The brainstorming Idea's that can actually be applied.”

“Always enjoyable and interesting. Good to get team together away from "work"”

“Team discussions and everyone's opinion counting”

“Agreeing actions we as a company can take without detracting from our core business or service delivery.”

Was there anything that could have been improved or done differently?

“Not that I can think of.”

“Yes, probably do it out of office hours if possible. This way we are not pressed for time and people aren't pulled away.”

“Nope all good, shame that [NE] and [FG] were unable to join.”

“We could've provided more subjects if we weren't so busy.”

Any other comments or feedback:

“Not that I can think of.”

“No. All good thus far.”

“Thank you”

“Look forward to getting our plan and putting it into action.”

Workshop 1 charity qualitative feedback from questionnaires

How did you find the workshop as a way of developing ideas for a package of changes to sit less in your organisation?

“Very helpful”

“Engaging and encouraged ideas”

“Very good – I liked the fact we were stood up! Good range of questions to consider and liked that no idea was seemed too outrageous”

“Alright, it makes you think about the personal”

“Made me think in a new way. It was good to work alongside people from different departments”

“Really useful way of bringing ideas out”

“More creative thinking, gives ideas”

“Set-up for creativity, but less practical in terms of what we can actually do”

“Good, creative. Groups worked well. Plenty of activities”

“Worked well. Standing was interesting – I wonder whether it made the session feel livelier”

What was particularly good about the workshop / what went particularly well?

“Expanding on already put down ideas is a good thing to do”

“Sharing ideas and thinking outside of the box”

“Working in groups, creative thinking using word association”

“The creative thinking random word selection adds unpredictability”

“It didn’t drag! Got to know more about colleagues. Interesting”

“We didn’t sit, good mix of staff”

“Working together to listen to different opinions and ideas”

“Opportunities to think outside the box”

“Ice-breaker, range of activities, word association”

“Nice opportunity to work with some people I rarely work with. The random word association generated interesting discussions”

Was there anything that could have been improved?

“Not sure”

Nil

Nil

“Not really”

“No”

“Desk at a suitable height to write”

Nil

“Understand what will actually change / whether SYHA backs”

“Word association maybe could have been explained in more detail with a written example”

“No”

Any other comments or feedback:

Nil

Nil

“Interested to know the eventual outcome of this”

Nil

Nil

“Like to have feedback on changes the organisation will make due to this workshop”

Nil

Nil

“Good session – I hope some of it is implemented and not just hypothetical”

“No”

Workshop 2 charity qualitative feedback from questionnaires

How did you find the workshop as a way of formulating a plan for a package of changes to sit less to be rolled-out in your organisation? Can you see how this plan could work in your organisation? Were barriers addressed?

“Somethings could be promoted to which people could have the choice to do things. More things will work whilst moving to the new building.”

“Good for formulating ideas and gathering those ideas. Would have been better to have more time to look into these barriers and how these could be addressed.”

“I found the session to be interesting and quite focused; we addressed barriers but also what our quick wins would be”

“The workshop generated a good discussion but I am not sure about who will take responsibility for implementing any of the suggested items as this wasn’t clear to me. There was only a small selection of people who were at the session”

“I found the workshop very productive and I can see the ideas suggested aiding wellbeing across the organisation”

“Good, inclusive and involved people”

What was particularly good about the workshop / what went particularly well?

“Looking at everyone’s ideas and contributing your own opinion worked well, everyone got their input”

“Standing! Working in groups and moving around tasks, interesting seeing other people’s ideas”

“Getting people together from different areas of the business to get a diverse perspective on the topic”

“People seemed very engaged with the workshop and were thinking of ways to introduce things into the business”

“The number of ideas generated and discussed”

“Thought about the same issue in different ways, individual level ideas are very different to corporate plans and it was good to see a mix”

Was there anything that could have been improved or done differently?

“More time for the end activity”

“Second session could have done with being slightly longer”

“Perhaps the aim could have been to find a couple of changes that will have a big impact and look at how we present these to the organisation in a way that’ll engage them”

“No”

“N/A”

“Difficult but involving more people – everyone was there who was enthusiastic about it anyway, reaching the people who are not motivated to change and finding out what would help them would be interesting”

Any other comments or feedback:

Nil

Nil

Nil

Nil

Nil

“Nothing you could have changed but it would have been nice if the company had allocated a budget for the changes so we could have a better idea on what is reasonable / possible”

Workshop 1 local authority qualitative feedback from questionnaires

How did you find the workshop as a way of developing ideas for a package of changes to sit less in your organisation?

“Enjoyable workshop. Thought provoking. Good to know that it is something being taken seriously.”

“Small and perfectly formed. Nicely informal with us able to fully express ourselves.”

“Ideas were more general about outside of work e.g., sports clubs, walking to work. Would like ideas about how to sit less during working hours. But take back a couple of ideas to put to team and implement.”

“Clever use of different tools to encourage “out of the box” thinking and idea generation. Some ideas may not be possible / realistic but good to push us past our perception of what may / may not be possible.”

“Very interesting range of activities. Good size of group.”

“Very good. Gave an opportunity to think of barriers to moving more at work in a creative / collaborative way.”

“Workshop size of 9 was just right. Allowed people to communicate with ease. Lots of good ideas which was helped as there was great communication.”

“I really enjoyed the workshop. As the session went on, we came up with some really good ideas.”

“Really fun and gave me lots of food for thought. Group size was about right.”

What was particularly good about the workshop / what went particularly well?

“Interesting methods of collecting ideas. Also, fun to take part in. Nice diversion from normal working day.”

“Just to brainstorm is an excellent way of exploring options.”

“Good to exchange ideas with people from other teams.”

“The word association was good – helped further encourage unusual / creative thinking.”

“We stood for most of the time! Everyone contributed. Some very interesting ideas and people developed each other’s initial thoughts.”

“Team work. Producing a list of ideas.”

“Was quite a fast pace. Standing allowed ideas to flow better. Very open / fun.”

“The words at the end were good and having to make links to moving more. Everyone seemed to be focussed and relaxed.”

“Word association exercise, as I had never done anything like that before.”

Was there anything that could have been improved?

Nil

“A work in progress... don’t think so at the moment.”

Nil

“Nope. All good and well run.”

Nil

“Nope!”

Nil

Nil

“A more creative way of brainstorming ideas for the first part e.g., personas.”

Any other comments or feedback:

Nil

“Keep up the good work. Very interested in seeing where this goes. Some good examples of employers who have initiated this would be good.”

“Good to get to know other people’s point of view – ideas that are not your own.”

Nil

“We did not know each other even though most of us worked in the same building – or I did not know the others.”

“Thanks for being so friendly. Very informative and willing to think outside of the box.”

Nil

“Looking forward to the next session.”

“Overall, really enjoyable and take some of the ideas away.”

Workshop 2 local authority qualitative feedback from questionnaires

How did you find the workshop as a way of formulating a plan for a package of changes to sit less to be rolled-out in your organisation? Can you see how this plan could work in your organisation? Were barriers addressed?

“Very useful workshop. Would be good to see the ideas talked about to see the ideas talked about actually happen. Anything that promotes a healthier working day has to be a good idea.”

“Good sessions. Yes. Yes.”

“Good. Inspiring and thought provoking. Will roll out to team.”

“Ideas sent before workshop were varied and interesting. Very well structured. I hope it will be rolled out – barriers addressed and, if overcome, some ideas will really work.”

What was particularly good about the workshop / what went particularly well?

“Well structured. Good way of drawing out ideas from people involved.”

“Varying discussion – positive attitude.”

“Good to shape a further initiative.”

“Structured. Ideas already sent out ready for discussion.”

Was there anything that could have been improved or done differently?

Nil
Nil
Nil

Any other comments or feedback:

“Enjoyed being involved. Thanks.”

Nil
Nil

“Will there be a follow-up meeting before plan is rolled out? Be really interesting to see next steps.”

Workshop 1 large corporation qualitative feedback from questionnaires

How did you find the workshop as a way of developing ideas for a package of changes to sit less in your organisation?

“I liked the idea of picking random words to make us think more out of the box in regards to ideas”

“Interesting to think “outside of the box” of ways we could incorporate moving more into the working day”

What was particularly good about the workshop / what went particularly well?

“Standing for most of it automatically makes you more energised”

“Relaxed, open discussion”

Was there anything that could have been improved?

“More people would have generated more ideas – but this couldn’t be helped”

“Would have been nice to have a bigger cross-section of participants”

Any other comments or feedback:

“It would be good for companies to get engaged at a higher level to actually be able to implement findings. News stories to engage the public might help. Plastic was the number 1 word in a recent children’s story competition – shock factor facts about sitting spread into the media would help maybe”

“N/A”

Workshop 2 large corporation qualitative feedback from questionnaires

How did you find the workshop as a way of formulating a plan for a package of changes to sit less to be rolled-out in your organisation? Can you see how this plan could work in your organisation? Were barriers addressed?

“Yes, I think we can make the app on the iPhone work for us being as we all have a work one at least. Manager would have to be the one to make sure we were all involved and build into weekly call”

“Good to see what could actually implement into our team. The ideas we had will work if everyone gets on board. I think the challenge element will help”

Appendix 12: Phase 3 recruitment emails and participant information sheets

Recruitment email: Phase 3 “before and after” volunteers

Subject: Sit Less at Work Research Project



Dear [organisation] staff,

**Do you sit at your desk all day?
Are you interested in sitting less at work?**

My name is Kelly and I have been given permission by your organisation to carry out an exciting new research project looking at reducing your sitting time at work.

Why is this important?

As you may have heard in the news recently, sitting for long periods puts you at a higher risk of a range of health problems such as neck/back pain, heart disease and diabetes. Finding ways to break-up and reduce your sitting time is therefore really important.

What is involved?

I have been working with a group of [organisation name] staff to help them develop a package of changes, named [insert package name here], which we are now ready to test out. I am asking for volunteers to be involved to measure whether [insert package name here] changes workplace sitting time as well as a range of other health and work-related measures.

If you volunteer to participate, you will be required to complete online questionnaires before and after [insert package name here] is rolled out in [organisation name]. You may also be randomly selected to wear a special device that accurately measures sitting time and/or asked to participate in a small group discussion to provide detailed feedback about [insert package name here].

What next?

I have attached an information leaflet and timeline which provides much more detail, so please take a few minutes to have a read through that. Feel free to get in touch either via email or phone if you have any questions or queries (my contact details are at the end of the information leaflet).

If you would like to participate, please reply to me (kelly.mackenzie@sheffield.ac.uk) by [time] on [date].

Many thanks for your time.

Best wishes, Kelly

Recruitment email: Phase 3 “before and after” focus group volunteers

Subject: Sit Less at Work – small group discussion



Dear all,

Thanks so much for all your interest and participation in this project so far.

The next part of the project is to conduct some small group discussions so that I can understand what your thoughts are about this project, what you think has worked well and what you think could have been done differently. I've attached the information sheet (which you've seen before) to provide a reminder of this part of the project.

I'd be really grateful if you could complete the Doodle Poll (link below) with your availability as soon as possible so that I can get some sessions booked in.

<https://doodle.com/poll/xxxx>

Also, just to remind you, there will be a final round of data collection wearing the devices too, which will take place the week beginning [insert date here]. I will be in touch closer to the time to let you know when the drop-in sessions to collect your packs will be.

If you have any questions about this part of the project, please do get in touch.

Best wishes, Kelly

Recruitment email: Phase 3 intervention implementer focus groups/interviews

Subject: Sit Less at Work Research Project



Dear [insert package name here] implementer,

Thank you again for supporting the implementation of [insert package name here]. Since it was rolled out on the [date], I have been collecting information on whether or not it has helped staff to sit less at work, the results of which will be available in due course.

What would support the interpretation of these results would be to understand how [insert package name here] was implemented and whether anything particularly hindered or helped the roll-out. Therefore, I am

asking if you would be willing to volunteer to take part in a small group discussion to explore these issues in more detail.

What is involved?

If you volunteer, you will be required to attend a short (max. 60 mins) group discussion with up to 8 of your colleagues/one-to-one interview [delete as appropriate]. The discussion will take place at a convenient location within your workplace at a date and time that suits the majority of volunteers/you [delete as appropriate].

What next?

I have attached an information leaflet which provides much more detail, so please take a few minutes to have a read through that. Feel free to get in touch either via email or phone if you have any questions or queries (my contact details are at the end of the information leaflet).

If you would like to participate, please reply to me (kelly.mackenzie@sheffield.ac.uk) by [time] on [date], after which I will arrange a suitable time/date for the discussion.

Many thanks for your time.

Best wishes, Kelly

[Recruitment email: Phase 3 key personnel interviews](#)

Subject: Sit Less at Work Research Project



Dear [key personnel's name],

My name is Kelly and I have been given permission by your organisation to contact you in your capacity as [job role] to discuss the recent roll-out of a package of changes, named [insert package name here], which intended to help [organisation name] staff to sit less at work.

Why is this important?

As you may have heard in the news recently, sitting for long periods puts you at a higher risk of a range of health problems such as neck/back pain, heart disease and diabetes. Helping staff in desk-based jobs to sit less at work is therefore really important.

What is involved?

If you volunteer, you will be asked to participate in a short (max. 60 mins) one-to-one interview to discuss your thoughts on how [insert package name here] was implemented and how this could have been improved. The

interview will take place at a date and time that suits you and either at a convenient location within your workplace or via the telephone (whichever you prefer).

What next?

I have attached an information leaflet which provides much more detail, so please take a few minutes to have a read through that. Feel free to get in touch either via email or phone if you have any questions or queries (my contact details are at the end of the information leaflet).

If you would like to participate, please reply to me (kelly.mackenzie@sheffield.ac.uk) by [time] on [date], after which I will arrange a suitable time/date for the interview.

Many thanks for your time.

Best wishes, Kelly

Phase 3 participant information sheet for “before and after” participants (including participation in focus groups)

You are being invited to take part in a research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read this information carefully and discuss it with others if you wish. If you would like to arrange a meeting or discuss anything further with the lead researcher, Kelly, please see her contact details at the end of this information sheet. Thank you for reading this.

1. Research project title

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations

2. What is the project’s purpose?

Sitting for long periods is linked to higher risks of health problems such as heart disease, diabetes, obesity, depression, neck/back problems, and early death. Prolonged sitting may be a particular problem in the workplace where many workers now sit in desk-based jobs for an average of six-hours a day. Therefore, there is a need to develop and test a package of changes to encourage staff to sit less at work.

This study has been split into three phases:

- Phase 1 explored the specific issues in your workplace that cause staff to sit for long periods (completed)
- Phase 2 involved the development of a low-cost package of changes, [package name to be inserted here], with a group of staff members from your organisation (completed)
- Phase 3 aims to test out [package name to be inserted here] to see if it results in a decrease in sitting time at work and to understand why it may or may not have worked.

It is Phase 3 of the study that you are being invited to participate in at this stage. [Package name to be inserted here] will be rolled out for 12 weeks in your organisation. You can choose to participate in whichever aspects of the [package name to be inserted here] that you like or are most appealing to you.

3. Why have I been chosen?

You have been chosen as your organisation has identified your job role as one that requires you to sit at a desk for long periods of time whilst at work.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part in the study. Your organisation has been informed that they should not put any pressure on you to participate. If you do agree to participate, you should know that you can withdraw from the study at any time, without having to give a reason. However, any data collected up to that point will be kept by the research team.

5. What will be involved if I choose to take part? (also see timeline attached)

All participants:

All participants will be asked to complete up to four questionnaires (provided online). The questionnaires will be requested the week before the 12-week [package name to be inserted here] begins, immediately after the 12-week period and then 3- and 6-months after that.

The questionnaires should take no longer than 15 minutes each to complete and will ask about: background information (age, gender, postcode, ethnicity, education, job title and job role); lifestyle factors (weight, height, smoking, alcohol, diet and physical activity levels); your general health and wellbeing; your work including recent sickness absences and how productive you feel. Feedback on the [package name to be inserted here] and information on any safety or adverse events that may have occurred as a result of the [package name to be inserted here] will also be collected.

Some participants:

You may be randomly selected to wear a small device known as activPAL3 (about an inch long and ¼ inch thick), which can measure sitting time. If selected, you will be asked to attend a short session (no longer than 30 minutes) at a convenient time at your workplace where you will be shown how to wear it and provided with instruction sheets to take home. The device needs to be secured to your thigh using a waterproof dressing. You will be requested to wear this device continually for 7 days before the 12-week [package name to be inserted here] begins, and then for 7 days immediately after the 12-week period, and then again for 7 days at 3- and 6-months after that. You will also need to complete a daily log during the times you are wearing the device to provide information such as what time you woke up, got to work, left work, went to bed, which is helps Kelly to interpret the information collected from the activPAL3 device.

You may also be asked to volunteer to also take part in a small group discussion, which will occur a few weeks after the 12-week [package name to be inserted here] has finished. It will be with up to 8 of your colleagues and will last no longer than 1 hour. It will take place in a meeting room in your workplace at a time convenient to you. The discussion will relate to your thoughts about the package of changes and how it could be improved. The discussion will be audio-recorded so that the research team can obtain an accurate reflection of the points you and your colleagues raise. The recording will then be typed up word-for-word, but at this stage, no names will be used, instead a random letter and number will replace your name, so the points you raise will be anonymised. The audio-recording of the discussion will be used for analysis only. Written quotes

will be used to illustrate findings in conference presentations, lectures, written reports and academic publications. No other use will be made of the data without your written permission, and no one outside the project will be allowed access to the original recording.

Time to attend both the activPAL3 information session and the small group discussion has been agreed by your organisation, so you do not need to seek specific permissions to participate, although you may wish to let your line manager know that you are planning to participate. If you do not wish to participate in the two additional parts of the study, please just let Kelly know.

6. What are the possible disadvantages and risks of taking part?

By rolling out the [package name to be inserted here] to encourage you to sit less at work, there is a small potential for increasing the number of accidents in the workplace due to the fact that you and your colleagues may be moving around your workplace more frequently. If any accidents do occur, please manage those according to your organisational policies, but also keep a detailed note (time, place, nature of accident, severity) of any incidents and report them to Kelly as soon as possible. The follow-up questionnaires will specifically ask about any incidents too should you forget to report them at the time.

For those who are selected to wear the activPAL3 device to measure sitting time, you need to be made aware that there have been a small number of cases of skin irritations reported due to the dressing that is used. If you know that you are allergic or sensitive to any type of dressings, please let Kelly know at the outset and you will not be asked to participate in this part of the study. If you do go on to develop a rash or itch, please remove both the dressing and device immediately and inform Kelly. If the irritation does not improve please seek medical advice.

For those who volunteer to take part in the small group discussion, you or a colleague may want to bring up some difficult subjects relating to experiences in the workplace. These issues will not be specifically asked about, but you or your colleagues may feel the need to raise them. These may relate to difficult relationships in the workplace or indeed workplace bullying. If these issues are brought up, Kelly will signpost you or your colleagues to appropriate support.

7. What are the possible benefits of taking part?

The aim of this study is to try to allow you to sit less at work. There are many reported benefits of this which may include: improvements in your general health and wellbeing, and improvements in concentration levels and how productive you are at work.

8. What happens if the research study stops earlier than expected?

If this is required, the reason(s) will be clearly explained to you.

9. What if I am unhappy about something?

If you wish to make a complaint about the way the research project is being conducted, then you should raise this in the first instance with Elizabeth Goyder, the project supervisor (contact details at the end of this leaflet). If you feel that your complaint has not been handled satisfactorily you can contact Professor John Brazier, Dean of the School of Health and Related Research at the University of Sheffield on 0114 2220726 or via email: j.e.brazier@sheffield.ac.uk who will address any further concerns you may have. If the complaint relates to how your personal data has been handled you can contact Anne Cutler, University of Sheffield Data Protection Officer on 0114 2221117 or via email dataprotection@sheffield.ac.uk. If you would like to escalate

your complaint further, you can contact the Information Commissioners Office details of which can be found at the following website: <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>

10. Will my taking part in this project be kept confidential?

Although you may not be able to mask from your colleagues or line manager your involvement in the study, all the information that is collected about and from you during the course of the research will be kept strictly confidential and stored securely. You will not be able to be identified in any reports or publications. Please note that any information you enter will be stored and processed using services provided by Qualtrics. These services have been the subject of independent assessment to ensure compliance with applicable data security standards. Further information can be found on the Qualtrics website (<https://www.qualtrics.com/security-statement/>).

11. What is the legal basis for processing my personal data?

According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>

12. What will happen to the data collected and the results of the research project?

The data collected during this study will be available to Kelly, her supervisory team and an administrator within the Public Health section of the School of Health and Related Research, University of Sheffield. Any identifiable information collected will be destroyed as soon as possible once it is clear that it will not affect the research purpose. All additional information will be securely stored in an anonymised form for up to 5 years after the completion of this project, after which point all collected data will be destroyed.

No identifiable information will be published in any reports or publications. It is planned that the results from this phase of the study will be published in an academic journal and presented at academic conferences. A summary of the results and outcomes from all three phases will be included in a report for your organisation, but no identifiable information will be included in these reports. A copy of your organisation's report will also be made available to everyone who participated in any phase of the study.

Due to the nature of this research, it is very likely that other researchers may find the data collected to be useful in answering future related research questions. Your explicit consent will be obtained for your data to be shared in this way.

13. Who is organising and funding the research?

The National Institute for Health Research (NIHR) is funding this research as part of the Kelly's training fellowship and PhD project.

14. Who is the "Data Controller"?

The University of Sheffield will act as the Data Controller for this study. This means that the University is responsible for looking after your information and using it properly.

15. Who has ethically reviewed the project?

The School of Health and Related Research Ethics Committee has ethically reviewed and approved Phase 3 of this research project.

For further information, please contact:

Lead researcher: Kelly Mackenzie, 07740786072, kelly.mackenzie@sheffield.ac.uk

Project Supervisor: Elizabeth Goyder, 0114 2220783, e.goyder@sheffield.ac.uk

Phase 3 participant information sheet for implementer focus group

You are being invited to take part in a research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read this information carefully and discuss it with others if you wish. If you would like to arrange a meeting or discuss anything further with the lead researcher, Kelly, please see her contact details at the end of this information sheet. Thank you for reading this.

1. Research project title

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations

2. What is the project's purpose?

Sitting for long periods is linked to higher risks of health problems such as heart disease, diabetes, obesity, depression, neck/back problems, and early death. Prolonged sitting may be a particular problem in the workplace where many workers now sit in desk-based jobs for an average of six-hours a day. Therefore, there is a need to develop and test a package of changes to encourage staff to sit less at work.

This study has been split into three phases:

- Phase 1 explored the specific issues in your workplace that cause staff to sit for long periods (completed)
- Phase 2 involved the development of a low-cost package of changes, [package name to be inserted here], with a group of staff members from your organisation (completed)
- Phase 3 aims to test out [package name to be inserted here] to see if it results in a decrease in sitting time at work and to understand why it may or may not have worked.

It is Phase 3 of the study that you are being invited to participate in at this stage. [Package name to be inserted here] will be rolled out for 12 weeks in your organisation. There is no expectation for you to participate in any of the elements of [package name to be inserted here] but if you'd like to then you can.

3. Why have I been chosen?

You have been chosen because you participated in Phase 2 of this research project and have knowledge about [package name to be inserted here] and how it was implemented.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part in the study. Your organisation has been informed that they should not put any pressure on you to participate. If you do agree to participate, you should know that you can withdraw from the study at any time, without having to give a reason. However, any data collected up to that point will be kept by the research team.

5. What will happen to me if I take part?

You will be asked to participate in a discussion with a group of up to 8 of your colleagues (who were also part of Phase 2), which will last approximately 1 hour. This discussion will occur within your workplace and at a time that is most convenient for you and your colleagues. Your organisation has agreed to allow you to participate in this discussion as part of your work time and you will not be financially penalised for taking part. The issues that will be discussed will relate to how you and your colleagues were able to put [package name to be inserted here] into action, whether it ran as planned and what hindered and helped you to achieve this. Prior to the discussion, you will also be asked to complete a brief questionnaire, which will provide the research team with some background information including your age, gender, ethnicity, job title or job role.

6. Will I be recorded, and how will the recorded material be used?

The discussion will be audio-recorded so that the research team can obtain an accurate reflection of the points you and your colleagues raise. The recording will then be typed up word-for-word, but at this stage, no names will be used, instead a random letter and number will replace your name, so the points you raise will be anonymised. The audio-recording of the discussion will be used for analysis only. Written quotes will be used to illustrate findings in conference presentations, lectures, written reports and academic publications. No other use will be made of the data without your written permission, and no one outside the project will be allowed access to the original recording.

7. What do I have to do?

If you agree to take part, Kelly, the lead researcher, will provide a list of potential times and dates for the discussion using an online poll and you will need to complete the poll with your availability. Kelly will then inform you of the meeting date and time based on the availability of the majority. You will then need to attend the meeting and be prepared to discuss issues relating to how [package name to be inserted here] was put into action.

8. What are the possible disadvantages and risks of taking part?

As the discussions will be taking place during your working day, it is likely that your colleagues or line manager will be aware that you are taking part in the study, so if this is of a concern to you please get in contact with Kelly. Also, you will need to give up an hour of your working time to be part of this study, although this will be at a time convenient to the majority of the volunteers. This has been agreed by your organisation, so you do not need to seek specific permissions to participate, although you may wish to let your line manager know that you are planning to participate.

As part of the discussions, there is a small possibility that you or a colleague may want to bring up some difficult subjects relating to experiences in the workplace. These issues will not be specifically asked about, but you or your colleagues may feel the need to raise them. These may relate to difficult relationships in the workplace or indeed workplace bullying. If these issues are brought up, Kelly will signpost you or your colleagues to appropriate support. There are no foreseen physical risks to participating in this research.

9. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in this part of the project, the information gained will be used to inform your organisation on how to more effectively put into action health and wellbeing initiatives, which could provide some benefit to you in the future.

10. What happens if the research study stops earlier than expected?

If this is required, the reason(s) will be clearly explained to you.

11. What if I am unhappy about something?

If you wish to make a complaint about the way the research project is being conducted, then you should raise this in the first instance with Elizabeth Goyder, the project supervisor (contact details at the end of this leaflet). If you feel that your complaint has not been handled satisfactorily you can contact Professor John Brazier, Dean of the School of Health and Related Research at the University of Sheffield on 0114 2220726 or via email: j.e.brazier@sheffield.ac.uk who will address any further concerns you may have. If the complaint relates to how your personal data has been handled you can contact Anne Cutler, University of Sheffield Data Protection Officer on 0114 2221117 or via email dataprotection@sheffield.ac.uk. If you would like to escalate your complaint further, you can contact the Information Commissioners Office details of which can be found at the following website: <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>

12. Will my taking part in this project be kept confidential?

As mentioned previously, given that the discussion is planned to be held within your workplace, it is likely that your colleagues or line manager will be aware that you are taking part in the study. However, all the information that is collected about and from you during the course of the research will be kept strictly confidential and stored securely. You will not be identifiable in any reports or publications.

13. What is the legal basis for processing my personal data?

According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>

14. What will happen to the data collected and the results of the research project?

The data collected during this study will be available to Kelly, her supervisory team and an administrator within the Public Health section of the School of Health and Related Research, University of Sheffield. Any identifiable information collected will be destroyed as soon as possible once it is clear that it will not affect the research purpose. All additional information will be securely stored in an anonymised form for up to 5 years after the completion of this project, after which point all collected data will be destroyed.

No identifiable information will be published in any reports or publications. It is planned that the results from this phase of the study will be published in an academic journal and presented at academic conferences. A summary of the results and outcomes from all three phases will be included in a report for your organisation, but no identifiable information will be included in these reports. A copy of your organisation's report will also be made available to everyone who participated in any phase of the study.

Due to the nature of this research, it is very likely that other researchers may find the data collected to be useful in answering future related research questions. Your explicit consent will be obtained for your data to be shared in this way.

15. Who is organising and funding the research?

The National Institute for Health Research (NIHR) is funding this research as part of the Kelly's training fellowship and PhD project.

16. Who is the “Data Controller”?

The University of Sheffield will act as the Data Controller for this study. This means that the University is responsible for looking after your information and using it properly.

17. Who has ethically reviewed the project?

The School of Health and Related Research Ethics Committee has ethically reviewed and approved Phase 3 of this research project.

For further information, please contact:

Lead researcher: Kelly Mackenzie, 07740786072, kelly.mackenzie@sheffield.ac.uk

Project Supervisor: Elizabeth Goyder, 0114 2220783, e.goyder@sheffield.ac.uk

Thank you very much for considering to take part in Phase 3 of this research study.

Phase 3 participant information sheet implementation interview

You are being invited to take part in a research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read this information carefully and discuss it with others if you wish. If you would like to arrange a meeting or discuss anything further with the lead researcher, Kelly, please see her contact details at the end of this information sheet. Thank you for reading this.

1. Research project title

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations

2. What is the project’s purpose?

Sitting for long periods is linked to higher risks of health problems such as heart disease, diabetes, obesity, depression, neck/back problems, and early death. Prolonged sitting may be a particular problem in the workplace where many workers now sit in desk-based jobs for an average of six-hours a day. Therefore, there is a need to develop and test a package of changes to encourage staff to sit less at work.

This study has been split into three phases:

- Phase 1 explored the specific issues in your workplace that cause staff to sit for long periods (completed)
- Phase 2 involved the development of a low-cost package of changes, [package name to be inserted here], with a group of staff members from your organisation (completed)
- Phase 3 aims to test out [package name to be inserted here] to see if it results in a decrease in sitting time at work and to understand why it may or may not have worked.

It is Phase 3 of the study that you are being invited to participate in at this stage. [package name to be inserted here] will be rolled out for 12 weeks in your organisation. There is no expectation for you to participate in any of the elements of [package name to be inserted here] but if you’d like to then you can.

3. Why have I been chosen?

You have been chosen because you have been involved in the implementation of the [package name to be inserted here] action plan.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part in the study. Your organisation has been informed that they should not put any pressure on you to participate. If you do agree to participate, you should know that you can withdraw from the study at any time, without having to give a reason. However, any data collected up to that point will be kept by the research team.

5. What will happen to me if I take part?

You will be asked to participate in a one-to-one interview with Kelly, the lead researcher, which will last approximately 1 hour. This interview will either occur within your workplace or via telephone and at a time that is most convenient for you. Your organisation has agreed to allow you to participate in this interview as part of your work time and you will not be financially penalised for taking part. The issues that will be discussed will relate to how you were able to put [package name to be inserted here] into action, whether it ran as planned and what hindered and helped you to achieve this. Prior to the interview, you will also be asked to complete a brief questionnaire, which will provide the research team with some background information including your age, gender, ethnicity, job title or job role.

6. Will I be recorded, and how will the recorded material be used?

The interview will be audio-recorded so that the research team can obtain an accurate reflection of the points you. The recording will then be typed up word-for-word, but at this stage, no names will be used, instead a random letter and number will replace your name, so the points you raise will be anonymised. The audio-recording of the discussion will be used for analysis only. Written quotes will be used to illustrate findings in conference presentations, lectures, written reports and academic publications. No other use will be made of the data without your written permission, and no one outside the project will be allowed access to the original recording.

7. What do I have to do?

If you agree to take part, you will need to provide Kelly with some times/dates that you are available to determine when is most suitable to hold the interview. You will then need to attend the interview (either in person or on the telephone, whichever you prefer) and be prepared to discuss issues relating to how [package name to be inserted here] was put into action.

8. What are the possible disadvantages and risks of taking part?

As the discussions will be taking place during your working day, it is likely that your colleagues or line manager will be aware that you are taking part in the study, so if this is of a concern to you please get in contact with Kelly. Also, you will need to give up an hour of your working time to be part of this study, although this will be at a time convenient to you. This has been agreed by your organisation, so you do not need to seek specific permissions to participate, although you may wish to let your line manager know that you are planning to participate.

As part of the discussions, there is a small possibility that you may want to bring up some difficult subjects relating to experiences in the workplace. These issues will not be specifically asked about, but you or your

colleagues may feel the need to raise them. These may relate to difficult relationships in the workplace or indeed workplace bullying. If these issues are brought up, Kelly will signpost you to appropriate support. There are no foreseen physical risks to participating in this research.

9. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in this part of the project, the information gained will be used to inform your organisation on how to more effectively put into action health and wellbeing initiatives, which could provide some benefit to you in the future.

10. What happens if the research study stops earlier than expected?

If this is required, the reason(s) will be clearly explained to you.

11. What if I am unhappy about something?

If you wish to make a complaint about the way the research project is being conducted, then you should raise this in the first instance with Elizabeth Goyder, the project supervisor (contact details at the end of this leaflet). If you feel that your complaint has not been handled satisfactorily you can contact Professor John Brazier, Dean of the School of Health and Related Research at the University of Sheffield on 0114 2220726 or via email: j.e.brazier@sheffield.ac.uk who will address any further concerns you may have. If the complaint relates to how your personal data has been handled you can contact Anne Cutler, University of Sheffield Data Protection Officer on 0114 2221117 or via email dataprotection@sheffield.ac.uk. If you would like to escalate your complaint further, you can contact the Information Commissioners Office details of which can be found at the following website: <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>

12. Will my taking part in this project be kept confidential?

As mentioned previously, given that the interview is planned to be held within your workplace, it is likely that your colleagues or line manager will be aware that you are taking part in the study. However, all the information that is collected about and from you during the course of the research will be kept strictly confidential and stored securely. You will not be identifiable in any reports or publications.

13. What is the legal basis for processing my personal data?

According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>

14. What will happen to the data collected and the results of the research project?

The data collected during this study will be available to Kelly, her supervisory team and an administrator within the Public Health section of the School of Health and Related Research, University of Sheffield. Any identifiable information collected will be destroyed as soon as possible once it is clear that it will not affect the research purpose. All additional information will be securely stored in an anonymised form for up to 5 years after the completion of this project, after which point all collected data will be destroyed.

No identifiable information will be published in any reports or publications. It is planned that the results from this phase of the study will be published in an academic journal and presented at academic conferences. A summary of the results and outcomes from all three phases will be included in a report for your organisation,

but no identifiable information will be included in these reports. A copy of your organisation's report will also be made available to everyone who participated in any phase of the study.

Due to the nature of this research, it is very likely that other researchers may find the data collected to be useful in answering future related research questions. Your explicit consent will be obtained for your data to be shared in this way.

15. Who is organising and funding the research?

The National Institute for Health Research (NIHR) is funding this research as part of the Kelly's training fellowship and PhD project.

16. Who is the "Data Controller"?

The University of Sheffield will act as the Data Controller for this study. This means that the University is responsible for looking after your information and using it properly.

17. Who has ethically reviewed the project?

The School of Health and Related Research Ethics Committee has ethically reviewed and approved Phase 3 of this research project.

For further information, please contact:

Lead researcher: Kelly Mackenzie, 07740786072, kelly.mackenzie@sheffield.ac.uk

Project Supervisor: Elizabeth Goyder, 0114 2220783, e.goyder@sheffield.ac.uk

Thank you very much for considering to take part in Phase 3 of this research study.

Phase 3 participant information sheet key personnel interviews

You are being invited to take part in a research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read this information carefully and discuss it with others if you wish. If you would like to arrange a meeting or discuss anything further with the lead researcher, Kelly, please see her contact details at the end of this information sheet. Thank you for reading this.

1. Research project title

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations

2. What is the project's purpose?

Sitting for long periods is linked to higher risks of health problems such as heart disease, diabetes, obesity, depression, neck/back problems, and early death. Prolonged sitting may be a particular problem in the workplace where many workers now sit in desk-based jobs for an average of six-hours a day. Therefore, there is a need to develop and test a package of changes to encourage staff to sit less at work.

This study has been split into three phases:

- Phase 1 explored the specific issues in your workplace that cause staff to sit for long periods (completed)
- Phase 2 involved the development of a low-cost package of changes, [package name to be inserted here], with a group of staff members from your organisation (completed)
- Phase 3 aims to test out [package name to be inserted here] to see if it results in a decrease in sitting time at work and to understand why it may or may not have worked.

It is Phase 3 of the study that you are being invited to participate in at this stage. [package name to be inserted here] will be rolled out for 12 weeks in your organisation. There is no expectation for you to participate in any of the elements of [package name to be inserted here] but if you'd like to then you can.

3. Why have I been chosen?

You have been chosen because you have been identified as a key member of staff who leads or supports health and wellbeing initiatives in your organisation. As a result, we are keen to understand your views on how [package name to be inserted here] was implemented and whether implementation could have been improved.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part in the study. Your organisation has been informed that they should not put any pressure on you to participate. If you do agree to participate, you should know that you can withdraw from the study at any time, without having to give a reason. However, any data collected up to that point will be kept by the research team.

5. What will happen to me if I take part?

You will be asked to participate in a one-to-one interview with Kelly, the lead researcher, which will last approximately 1 hour. This interview will either occur within your workplace or via telephone and at a time that is most convenient for you. Your organisation has agreed to allow you to participate in this discussion as part of your work time and you will not be financially penalised for taking part. The issues that will be discussed will relate to your thoughts about [package name to be inserted here] as an initiative to encourage staff to sit less at work, how it was implemented and how this could be improved, and your perceptions of the impact of this initiative. Prior to the discussion, you will also be asked to complete a brief questionnaire, which will provide the research team with some background information including your age, gender, ethnicity, job title or job role.

6. Will I be recorded, and how will the recorded material be used?

The interview will be audio-recorded so that the research team can obtain an accurate reflection of the points you raise. The recording will then be typed up word-for-word, but at this stage no names will be used, instead a random letter and number will replace your name, so the points you raise will be anonymised. The audio-recording of the discussion will be used for analysis only. Written quotes will be used to illustrate findings in conference presentations, lectures, written reports and academic publications. No other use will be made of the data without your written permission, and no one outside the project will be allowed access to the original recording.

7. What do I have to do?

If you agree to take part, you will need to provide Kelly with some times/dates that you are available to determine when is most suitable to hold the interview. You will then need to attend the interview (either in person or on the telephone, whichever you prefer) and be prepared to discuss issues relating to how [package name to be inserted here] was put into action.

8. What are the possible disadvantages and risks of taking part?

As the interview will be taking place during your working day, it is likely that your colleagues or line manager will be aware that you are taking part in the study, so if this is of a concern to you please get in contact with Kelly. Also, you will need to give up an hour of your working time to be part of this study, although this will be at a time most convenient to you. This has been agreed by your organisation, so you do not need to seek specific permissions to participate, although you may wish to let your line manager know that you are planning to participate.

As part of the interview, there is a small possibility that you may want to bring up some difficult subjects relating to experiences in the workplace. These issues will not be specifically asked about, but you may feel the need to raise them. These may relate to difficult relationships in the workplace or indeed workplace bullying. If these issues are brought up, Kelly will signpost you to appropriate support. There are no foreseen physical risks to participating in this research.

9. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in this part of the project, the information gained will be used to inform your organisation on how to more effectively put into action health and wellbeing initiatives, which could provide some benefit to you in the future.

10. What happens if the research study stops earlier than expected?

If this is required, the reason(s) will be clearly explained to you.

11. What if I am unhappy about something?

If you wish to make a complaint about the way the research project is being conducted, then you should raise this in the first instance with Elizabeth Goyder, the project supervisor (contact details at the end of this leaflet). If you feel that your complaint has not been handled satisfactorily you can contact Professor John Brazier, Dean of the School of Health and Related Research at the University of Sheffield on 0114 2220726 or via email: j.e.brazier@sheffield.ac.uk who will address any further concerns you may have. If the complaint relates to how your personal data has been handled you can contact Anne Cutler, University of Sheffield Data Protection Officer on 0114 2221117 or via email dataprotection@sheffield.ac.uk. If you would like to escalate your complaint further, you can contact the Information Commissioners Office details of which can be found at the following website: <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>

12. Will my taking part in this project be kept confidential?

As mentioned previously, given that the interview is planned to be held within your workplace, it is likely that your colleagues or line manager will be aware that you are taking part in the study. However, all the information that is collected about and from you during the course of the research will be kept strictly confidential and stored securely. You will not be identifiable in any reports or publications.

13. What is the legal basis for processing my personal data?

According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>

14. What will happen to the data collected and the results of the research project?

The data collected during this study will be available to Kelly, her supervisory team and an administrator within the Public Health section of the School of Health and Related Research, University of Sheffield. Any identifiable information collected will be destroyed as soon as possible once it is clear that it will not affect the research purpose. All additional information will be securely stored in an anonymised form for up to 5 years after the completion of this project, after which point all collected data will be destroyed.

No identifiable information will be published in any reports or publications. It is planned that the results from this phase of the study will be published in an academic journal and presented at academic conferences. A summary of the results and outcomes from all three phases will be included in a report for your organisation, but no identifiable information will be included in these reports. A copy of your organisation's report will also be made available to everyone who participated in any phase of the study.

Due to the nature of this research, it is very likely that other researchers may find the data collected to be useful in answering future related research questions. Your explicit consent will be obtained for your data to be shared in this way.

15. Who is organising and funding the research?

The National Institute for Health Research (NIHR) is funding this research as part of the Kelly's training fellowship and PhD project.

16. Who is the "Data Controller"?

The University of Sheffield will act as the Data Controller for this study. This means that the University is responsible for looking after your information and using it properly.

17. Who has ethically reviewed the project?

The School of Health and Related Research Ethics Committee has ethically reviewed and approved Phase 3 of this research project.

For further information, please contact:

Lead researcher: Kelly Mackenzie, 07740786072, kelly.mackenzie@sheffield.ac.uk

Project Supervisor: Elizabeth Goyder, 0114 2220783, e.goyder@sheffield.ac.uk

Thank you very much for considering to take part in Phase 3 of this research study.

Appendix 13

a: Phase 3 consent forms

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations (Phase 3 – “before and after” data collection, activPAL3 participants)

| Please tick the appropriate boxes | Yes | No |
|--|--------------------------|--------------------------|
| Taking Part in the Project | | |
| I have read and understood the project information sheet dated 23/05/2018. (If you answer No to this question please do not proceed with this consent form until you are fully aware of what your participation in the project will mean.) | <input type="checkbox"/> | <input type="checkbox"/> |
| I have been given the opportunity to ask questions about the project. | <input type="checkbox"/> | <input type="checkbox"/> |
| I agree to take part in the project. I understand that taking part in the project will include: attending a 30-minute session to be shown how to wear the activPAL3 device; wearing the activPAL3 device continually for 7 days at four different times throughout Phase 3 and completing associated daily logs; and completing up to four online questionnaires spread throughout the duration of Phase 3 of the project. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand that my taking part is voluntary and that I can withdraw from the study at any time; I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw. However, any data collected up to that point will be kept by the research team. | <input type="checkbox"/> | <input type="checkbox"/> |
| How my information will be used during and after the project | | |
| I understand my personal details such as name, phone number, address and email address etc. will not be revealed to people outside the project. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs unless I specifically request this. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form. | <input type="checkbox"/> | <input type="checkbox"/> |
| I give permission for the activPAL3 and questionnaire data that I provide to be deposited in The University of Sheffield Research Data Catalogue and Repository, so it can be used for related future research and learning | <input type="checkbox"/> | <input type="checkbox"/> |
| So that the information you provide can be used legally by the researchers | | |
| I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield. | <input type="checkbox"/> | <input type="checkbox"/> |

Name of participant [printed]

Signature

Date

Name of Researcher [printed]

Signature

Date

Project contact details for further information:Lead researcher: Kelly Mackenzie, 07740786072, kelly.mackenzie@sheffield.ac.ukProject Supervisor: Elizabeth Goyder, 0114 2220783, e.goyder@sheffield.ac.ukDean of the School of Health and Related Research at the University of Sheffield: Professor John Brazier, 0114 2220726, j.e.brazier@sheffield.ac.uk

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations (Phase 3 – “before and after” focus group participants)

| Please tick the appropriate boxes | Yes | No |
|--|--------------------------|--------------------------|
| Taking Part in the Project | | |
| I have read and understood the project information sheet dated 28/06/2018. (If you answer No to this question please do not proceed with this consent form until you are fully aware of what your participation in the project will mean.) | <input type="checkbox"/> | <input type="checkbox"/> |
| I have been given the opportunity to ask questions about the project. | <input type="checkbox"/> | <input type="checkbox"/> |
| I agree to take part in the project. I understand that taking part in this part of the project includes: attending a 1-hour small group discussion (which will be audio-recorded) to understand your thoughts about the package that has been rolled out in your workplace. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand that my taking part is voluntary and that I can withdraw from the study at any time; I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw. However, any data collected up to that point will be kept by the research team. | <input type="checkbox"/> | <input type="checkbox"/> |
| How my information will be used during and after the project | | |
| I understand my personal details will not be revealed to people outside the project. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs unless I specifically request this. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form. | <input type="checkbox"/> | <input type="checkbox"/> |
| I give permission for the data that I provide and transcripts of the audio-recordings to be deposited in The University of Sheffield Research Data Catalogue and Repository, so it can be used for related future research and learning. | <input type="checkbox"/> | <input type="checkbox"/> |
| So that the information you provide can be used legally by the researchers | | |
| I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield. | <input type="checkbox"/> | <input type="checkbox"/> |

Name of participant [printed]

Signature

Date

Name of Researcher [printed]

Signature

Date

Project contact details for further information:

Lead researcher: Kelly Mackenzie, 07740786072, kelly.mackenzie@sheffield.ac.uk

Project Supervisor: Elizabeth Goyder, 0114 2220783, e.goyder@sheffield.ac.uk

Dean of the School of Health and Related Research at the University of Sheffield: Professor John Brazier, 0114 2220726, j.e.brazier@sheffield.ac.uk

Sit Less at Work Project: Feasibility of low-cost interventions to reduce workplace sitting time in different organisations (Phase 3 – implementation participant interviews)

| <i>Please tick the appropriate boxes</i> | Yes | No |
|--|--------------------------|--------------------------|
| Taking Part in the Project | | |
| I have read and understood the project information sheet dated 21/02/2019. (If you answer No to this question please do not proceed with this consent form until you are fully aware of what your participation in the project will mean.) | <input type="checkbox"/> | <input type="checkbox"/> |
| I have been given the opportunity to ask questions about the project. | <input type="checkbox"/> | <input type="checkbox"/> |
| I agree to take part in the project. I understand that taking part in the project will include: completing a brief questionnaire to provide some background information; and attending a 1-hour interview, which will be audio-recorded, to understand your thoughts about how the package of changes was rolled out and whether it happened as planned. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand that my taking part is voluntary and that I can withdraw from the study at any time; I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw. However, any data collected up to that point will be kept by the research team. | <input type="checkbox"/> | <input type="checkbox"/> |
| How my information will be used during and after the project | | |
| I understand my personal details such as name, phone number, address and email address etc. will not be revealed to people outside the project. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs unless I specifically request this. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form. | <input type="checkbox"/> | <input type="checkbox"/> |
| I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form. | <input type="checkbox"/> | <input type="checkbox"/> |
| I give permission for the questionnaire data that I provide and transcripts of the audio-recordings to be deposited in The University of Sheffield Research Data Catalogue and Repository, so it can be used for related future research and learning. | <input type="checkbox"/> | <input type="checkbox"/> |

| | | |
|---|--------------------------|--------------------------|
| I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form. | <input type="checkbox"/> | <input type="checkbox"/> |
| I give permission for the questionnaire data that I provide and transcripts of the audio-recordings to be deposited in The University of Sheffield Research Data Catalogue and Repository, so it can be used for related future research and learning | <input type="checkbox"/> | <input type="checkbox"/> |
| So that the information you provide can be used legally by the researchers | | |
| I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield. | <input type="checkbox"/> | <input type="checkbox"/> |

Name of participant [printed]

Signature

Date

Name of Researcher [printed]

Signature

Date

Project contact details for further information:

Lead researcher: Kelly Mackenzie, 07740786072, kelly.mackenzie@sheffield.ac.uk

Project Supervisor: Elizabeth Goyder, 0114 2220783, e.goyder@sheffield.ac.uk

Dean of the School of Health and Related Research, University of Sheffield: Professor John Brazier, 0114 2220726, j.e.brazier@sheffield.ac.uk

b: Phase 3 ethics application



Application 019368

Section A: Applicant details

Date application started:
Mon 30 April 2018 at 11:13

First name:
Kelly

Last name:
Mackenzie

Email:
kjmackenzie1@sheffield.ac.uk

Programme name:
Health and Related Research (PhD/Health & Related Res FT) - HARR31

Module name:
N/A

Last updated:
23/05/2018

Department:
School of Health and Related Research

Applying as:
Postgraduate research

Research project title:
Feasibility low-cost, co-produced interventions to reduce workplace sitting time in different organisations (Phase 3)

Similar applications:
012219 (which referred to Phases 1 and 2 of the project)

Section B: Basic information

Supervisor

| Name | Email |
|------|-------|
|------|-------|

| | |
|------------------|--------------------------|
| Elizabeth Goyder | e.goyder@sheffield.ac.uk |
|------------------|--------------------------|

Proposed project duration

Start date (of data collection):
Fri 1 June 2018

Anticipated end date (of project):
Mon 30 September 2019

3: URMS number (where applicable)

URMS number:
R/146782-11-1

Suitability

Takes place outside UK?

No

Involves NHS?

No

Human-Interventional study?

Yes

ESRC funded?

No

Likely to lead to publication in a peer-reviewed journal?

Yes

Led by another UK institution?

No

Involves human tissue?

No

Clinical trial?

No

Social care research?

No

Involves adults who lack the capacity to consent?

No

Involves research on groups that are on the Home Office list of 'Proscribed terrorist groups or organisations'?

No

Vulnerabilities

Involves potentially vulnerable participants?

Yes

Involves potentially highly sensitive topics?

No

Section C: Summary of research

1. Aims & Objectives

The overall aim of this research project is to develop and evaluate the feasibility of low-cost, co-produced interventions to reduce sitting time in a range of different organisations. The first two phases of this project focused on understanding barriers to sit less interventions (Phase 1 - complete) and the co-production of organisation-specific interventions within four participating organisations (Phase 2 - almost complete). This ethics application relates only to the final phase of the project (Phase 3), the aim of which is to evaluate the feasibility and the process of these sit less interventions within the four participating organisations using mixed methods.

There are three parts to Phase 3 of this study, each with their own sub-aims which are as follows:

- a) To undertake an outcome evaluation of the interventions using various before and after measures
- b) To gain in-depth qualitative feedback on the feasibility of the interventions from a sub-group of the participants
- c) To undertake a process evaluation to understand how the intervention was implemented and what supported or hindered the implementation process from members of the intervention development team and key personnel in the organisation.

Objectives of Phase 3 of this project are as follows:

- To provide each organisation with an intervention start date
- To obtain pre- and post-intervention data relating to: demographics, lifestyle factors, sitting time and physical activity (both objectively and subjectively); general health and wellbeing; sickness absence, productivity and presenteeism; response rates, attrition rates and dropouts; awareness of intervention and the various elements; safety and adverse events
- To conduct focus groups after the intervention with participants
- To conduct focus groups with members of the intervention development groups and interviews with key members of staff within each organisation (e.g. human resources, occupational health, managing directors/chief executives) to understand their thoughts on the implementation and impact of the intervention

- To analyse quantitative and qualitative data
- To write-up the evaluation as part of the lead researcher's thesis and also for publication in a peer-reviewed journal and to disseminate findings to each organisation via an organisation-specific report

2. Methodology

Phase 3 will utilise a mixed methods before and after intervention study design. The mixed methods approach will allow both a quantitative and qualitative data collection and analysis, which will in turn enable an assessment of whether the intervention worked, in which circumstances and for whom. This more in-depth understanding of both the process and the outcomes will be crucial for the development of the future, more robust evaluations when scaling-up this intervention or translating it into other organisations.

There are four participating organisations involved in this study: a local council, a large corporation, a voluntary sector organisation and a small business, all based within South Yorkshire. Phase 1 of this project provided an understanding of the barriers and facilitators to reducing sitting in each of the four organisations. Phase 2 (still underway) involves the co-production of four interventions (one per participating organisation) to help staff to sit less in the workplace. It is these co-produced interventions that are going to be tested (each are going to be rolled out for 12 weeks, but the roll-outs will be staggered). Once the interventions have been finalised and a start date decided upon, it will be up to each of the participating organisations to implement the interventions. The lead researcher will only be involved in collecting the data; the running of the intervention will be led by the intervention development group within each organisation.

Although the final content of these interventions is not yet finalised, given the need for the interventions to be low-cost and based on some earlier pilot work, they are likely to include elements such as:

- Posters or prompts to remind staff to sit less
- Emails with helpful tips of ways to sit less, e.g. walking or standing meetings
- A social element involving workplace champions
- The use of social media to spread the message of the intervention and its benefits
- Support from management via emails and "leading by example"
- Changes in the way the environment is used, e.g. encouraging the use of toilets/printers on different floors.

Phase 3a: Outcome Evaluation

Data to be collected at baseline only will include demographic information (age, gender, postcode, ethnicity, education, job title and a brief description), lifestyle factors (body mass index, smoking, diet, alcohol consumption).

Data to be collected at baseline, immediately post-intervention, then at 3- and 6-months post-intervention include:

- Sitting time and physical activity time when at work (using the Occupational Sitting and Physical Activity Questionnaire (OSPAQ)).
- Daily sitting time and physical activity time (using items derived from the International Physical Activity Questionnaire (IPAQ)).
- Objective daily sitting time and physical activity levels (broken-down into workplace and out-of-workplace) measured using activPAL3™ worn on the thigh of participants using Tegaderm™ as a waterproof adhesive. This will be accompanied by a daily log, which participants complete to indicate the time they woke up, got to work, left work, went to bed, removed the device etc. This log will aid the analysis/interpretation of the activPAL3 data.
- General health and wellbeing assessed using relevant items from the Short Form 36 Health Survey.
- Work-related measures (sickness absence, productivity and presenteeism) will be subjectively measured using self-report. These data will be collected using relevant items from the WHO Health and Work Performance Questionnaire. Organisational-level objective data relating to sickness absence will be requested (without any personal identifiable information), but access to these data may be dependent on the individual organisation's governance arrangements.

Data to be collected immediately post-intervention:

- Study response rates, attrition rates and drop-outs will be monitored throughout the running of the intervention and post-intervention.
- Awareness of intervention and its various elements using the post-intervention questionnaires.
- Safety and adverse events reporting will be encouraged throughout the running of the intervention and a specific question relating to this will be included in the post-intervention questionnaires.

Phase 3b: Intervention Feasibility

Focus groups will also be conducted in each participating organisation with a sub-group of participants within four-to-six weeks of the intervention ending. The number of focus groups will be dependent on organisation size, but is likely to be between two and four per organisation. Focus groups will be audio-recorded and transcribed by a member of the Public Health Administration team. Qualitative data relating to participants' perceptions of the feasibility of the intervention and the outcome measures used will be discussed aiming to explore six key dimensions based on previous pilot work by the lead researcher:

1. General perceptions of the intervention as a whole
2. The feasibility of the various elements of the intervention and outcome measures
3. The acceptability of the various elements of the intervention and outcome measures
4. Elements of the intervention that did/did not work
5. Suggested improvements to the intervention
6. Which elements or behaviour changes have remained since the end of the intervention.

Phase 3c: Process Evaluation

Focus groups will also be conducted with members of the original intervention development groups (from Phase 2) to explore which elements of the intervention were implemented and what the barriers and facilitators were to implementation.

There will also be interviews conducted with key personnel in each organisation, e.g. a staff member from human resources and

occupational health, and a managing director or chief executive, to understand their thoughts on the implementation and impact of the intervention in their organisation.

Each of these focus groups and interviews will be audio-recorded and transcribed by a member of the Public Health Administration Team. At least one focus group with intervention development group members will be conducted per organisation. The number of interviews depends on the size and structure of each organisation, but is likely to be between one and four per organisation.

3. Personal Safety

Raises personal safety issues? Yes

Phase 3 of this research project described in this ethics application will involve the lead researcher conducting activities off the University premises. To minimise any potential risks to this lone working, appropriate mechanisms will be put in place to protect the safety of the lead researcher e.g. someone will always be aware of where she is supposed to be and for how long and a mobile phone will be carried at all times. Nevertheless, given the nature of the research it is unlikely that there will be any significant risks to the safety of the lead researcher.

Section D: About the participants

1. Potential Participants

The lead researcher has a named contact within each of the four participating organisations who has helped to identify and recruit participants for Phases 1 and 2 of this project. These same contacts will also be involved in identifying and recruiting participants for Phase 3 of this project.

Phase 3a:

Potential participants (employees and managers) for the "pre-post" intervention measures need to fulfill the following criteria:

- Be 18 years or older
- Work in one of the four participating organisations
- Be employed in a job which involves spending the majority of working time sitting at a desk, e.g. administration, customer service, help-desk professions, call-centre workers, receptionists, managers
- Have no plans to leave the organisation during the study period
- Be available during the pre- and post-intervention data collection periods
- Not be pregnant nor have any limitation that prevents short periods of standing/moving, as the intervention will encourage standing/moving as an alternative to sitting.

Depending on the organisation size, it is anticipated that 30 to 50 participants in each organisation will take part in quantitative data collection (except for the small business where it is hoped at least two-thirds of total staff will be recruited). A sub-group of 10-25 will be randomly assigned to wearing the activPAL devices (except for the small business where all volunteers will be asked to wear the activPAL devices).

Phase 3b:

For the post-intervention focus groups, a sub-group of 4-20 participants from each organisation will be recruited from those providing "pre-post" intervention measures.

Phase 3c:

A sample of the intervention development group (who participated in Phase 2) will be asked to volunteer to take part in a further focus group to explore factors relating to intervention implementation. Consent for participation in Phase 3 was not formally sought at the time participants agreed to take part in Phase 2 as the process evaluation part of this project has developed during the course of the research and was not planned at the outset. The lead researcher is still in contact with all Phase 2 participants at present, as Phase 2 is still underway in all participating organisations. Therefore, the lead researcher will contact all these participants (which is required for the GDPR anyway) to ask if they would like to opt out of being contacted for Phase 3, as well as informing them of the required GDPR information (i.e. the legal basis, data controller, data processor, how will their data be used, where it will be stored, that it will be anonymised, when the data will be destroyed, and who to contact to withdraw and complain).

Further, key personnel (e.g. human resources, occupational health, managing directors/chief executives) from each organisation (1-4 participants from each organisation) will be asked to volunteer to take part in interviews to understand the organisational impacts of the intervention. These key personnel will be identified with the help from the named contacts in each of the four organisations.

There is potential concern that employees of the participating organisations may not be in a position to exercise unfettered informed consent as a result of undue pressure placed on employees by their employing organisation to get involved in the study. Every attempt will be made to ensure organisations do not apply any pressure on employees by highlighting this issue with the management in each of the organisations and that potential participants are aware that there is no requirement to participate. Due to the nature of this study topic - the need to test interventions to reduce sitting time and the workplace being a key setting where prolonged sitting is an issue - this study cannot be conducted in an alternative setting.

2. Recruiting Potential Participants

Phase 3a:

The lead researcher will send a recruitment email along with the participant information sheet to the contact within each of the four participating organisations. For this phase it is hoped that random samples of employees meeting the inclusion criteria will be recruited to reduce the likelihood of selection bias. Advice will be sought from the contacts as to how a random sample of participants can be selected (e.g. using internal mailing lists and random numbers). If the organisations do not agree to provide me with the necessary information to do this (e.g. for information governance or data protection reasons), or are not willing to undertake the process themselves (e.g. due to time restraints) then convenience samples will be used. The contacts in each organisation will then disseminate the email and participant information sheet to the relevant staff from the lead researcher. Relevant staff will be those identified by the contact who are in desk-based occupations within the organisation. Participants will not be selected based on any other factor e.g. obese people will not be singled-out. In the case of random sampling, the email from the lead researcher will be sent via the contact in each organisation and addressed to each individual; in the case of convenience sampling, the same email will be distributed via the contact in each organisation to all staff, but be addressed more generically e.g. "Dear [organisation name] staff". Interested participants will then be advised to contact the lead researcher directly so that she can check that they meet the inclusion/exclusion criteria prior to formally enrolling them in the study.

In the small business, random sampling will not be feasible due to there being only eight members of staff. Therefore, a convenience sample of employees from the small business will be used instead (with the hope of recruiting at least two-thirds of the staff). The sampling strategy used for each organisation will be clearly highlighted in any data analysis.

A random sample of the volunteers in each organisation will also be asked to wear the activPAL devices.

Phase 3b:

Convenience sampling will be used to recruit to the post-intervention focus groups. Participating staff will be emailed by the lead researcher to ask to volunteer to take part in these focus groups.

Phase 3c:

The lead researcher will use email contact details already obtained during Phase 2 of the study to contact members of the intervention development groups from each organisation to ask if they would like to participate in focus group discussions. This will be achieved using convenience sampling. Purposeful sampling will be used to recruit key personnel for interviews who will be identified via the contact in each organisation.

2.1. Advertising methods

Will the study be advertised using the volunteer lists for staff or students maintained by CiCS? No

- not entered -

3. Consent

Will informed consent be obtained from the participants? (i.e. the proposed process) Yes

All potential study participants will be provided with the relevant participant information leaflet (depending on whether they are participating in Phase 3 a, b, or c) via recruitment email and informed that they can call or email the lead researcher with any questions or queries relating to involvement in the research study that they may want to discuss. In order for participants to provide informed consent, the participant information leaflet will include:

- Details of the overall research project including its importance and aims
- What would be expected of them by participating in the various aspects of Phase 3 (e.g. time commitments, data to be collected and information they would need to provide)
- What the potential risks are to participating and what will be done to minimise these risks
- Details of how the data they provide will be stored and kept confidential to all (including their employing organisation)
- It will be clearly highlighted that there should be no pressure for them to participate in the study and that they can withdraw at anytime without having to give a reason
- Contact details of the lead researcher and primary supervisor will be given if they would like to ask any questions or raise any issues of concern.

If they would like to participate, they will be asked to sign a consent form when they complete the baseline data collection session (Phase 3a), or when they attend the focus groups or interviews (Phase 3b and c).

4. Payment

Will financial/in kind payments be offered to participants? No

5. Potential Harm to Participants

What is the potential for physical and/or psychological harm/distress to the participants?

There is limited potential for any form of harm to participants during their involvement in Phase 3 of this research project.

Phase 3a:

Participation in the intervention has a small potential for increasing the number of accidents in the workplace due to the fact that the participants are likely to be moving around their workplaces more frequently.

A sub-sample of participants will have some objective data collected relating to sitting time, standing time, and time spent being physically active. This data will be collected using a small device (activPAL3) which will need to be taped to each participant's thigh using a Tegaderm waterproof dressing for 7 days prior to the start of the intervention and 7 days after. There have been cases of skin irritation due to the Tegaderm dressing.

Phase 3b and c:

There is a small possibility that, during the focus group discussions or interviews, sensitive issues may be brought up by the participants e.g. bullying in the workplace or difficult relationships with colleagues, which have the potential to cause psychological distress.

How will this be managed to ensure appropriate protection and well-being of the participants?

Phase 3a:

Participants will be advised to manage any workplace accidents as per their local organisational policies and keep a detailed note (time, place, nature of accident, severity) of any incidents and report them to the lead researcher as soon as possible. In addition, because of the nature of the intervention and the possibility that the wider workforce may be exposed to it (not just those who are participating in the study), information will be requested from each organisation on the overall accident rate during the intervention period and anonymised details of any accidents that may have been related to the intervention. These will then be cross-referenced with any accidents already notified to the lead researcher so that there is no duplicate counting.

Each participant will be asked if they have any known allergies to any medical dressings. Each participant will also be informed of the possibility of skin irritation related to the dressing and advised that if that should develop, to remove the device and dressing and attach to the other leg. If the irritation continues, both the dressing and device should be removed immediately, and if the irritation does not improve to seek medical advice. Again, the participant will be encouraged to inform the lead researcher if this occurs as soon as possible. This information will be provided in a device information leaflet, for the participants to take home.

Phase 3b and c:

Prior to beginning the focus group discussions, "ground-rules" will be set with agreement of the participants which will include keeping information discussed during the focus group between the group only. Hopefully, this will allow participants to feel more comfortable to discuss potentially difficult issues if they feel that they need to. If sensitive issues are raised by the participants, then the lead researcher will signpost participants to relevant material/support.

Section E: About the data

1. Data Confidentiality Measures

Phase 3a, b and c:

Questionnaires will be completed by the participants providing some basic demographic/ background information (e.g. postcode, age, gender, ethnicity, educational attainment, job title, job role, work-time equivalent) and other potentially sensitive information. It may be the case, particularly for participants in the small business, where the sample will be drawn from a small population, that even when collated, this data is enough to disclose the identity of participants. If this is the case, this data will not be published and withdrawn from any analyses. Any data that is collected that involves small enough numbers for participants to be potentially identified, i.e. if $n <= 5$ then these data will be suppressed and not published. Again, this may be a particular issue for the small business, but will be the standard protocol for data from all participating organisations.

All participant's in Phase 3a will be required to state their name at the start of each questionnaire. This will allow data from the subsequent questionnaires to be linked. As soon as the data is linked, the name will be removed. It is not possible to provide each participant with a unique identifier as they will be completing the questionnaires via Google Forms and would need to remember / know their unique identifier to complete the questionnaire and the lead researcher does not want this to be a barrier to completion.

It will be further highlighted to participants in the information leaflet that identifiable data will not be shared with the employer. An organisation-specific report will be produced at the end of the entire research project, but the data presented here will be anonymised and no participant identifiable information will be published.

Finally, it may be difficult for employees to mask their involvement in this study from their colleagues and employer (again particularly in the small business) due to the fact that a sub-group will be wearing a device on their thigh and some of the data collection (e.g. focus groups and interviews) will be taking place within the workplaces of the participants and during working hours. Every attempt will be made for study involvement to be masked, but due to pragmatic difficulties of this, this issue will be explicitly highlighted in the information leaflet. However, given the nature of the study and the fact that the data being collected is unlikely to be particularly sensitive, it is not anticipated that this will be a major concern to participants.

2. Data Storage

The lead researcher will have control of all the data generated by this research project. This data includes:

- Background information/demographics from questionnaires (collected online using Google Forms or using hard copies where

participants are met in person e.g. for focus groups and interviews)

- Before and after questionnaire data (collected online using Google Forms)
- Feedback gained from evaluation questionnaires (collected online using Google Forms)
- Audio-recordings of focus group discussions and interviews
- Transcriptions of focus group discussions
- activPAL3 data and activPAL daily logs

Data analysis will be conducted by the lead researcher and take place primarily at her workplace using an encrypted, password-protected computer. Occasionally data analysis may occur in the home of the lead researcher using an encrypted (already completed by SchARR IT), password protected laptop. When working from home, the lead researcher will access the X drive via a VPN.

As the surveys will be conducted using Google Forms, participants will be made aware (in the information sheet) that their data will be processed via Google. Extra care will be taken with sharing options when using Google Drive for the storage of any survey data. If/when the lead researcher leaves the University of Sheffield, the ownership of these data will be transferred to the primary supervision (Elizabeth Goyder).

The focus group discussions and interviews will be audio-recorded using an un-encrypted device, but transferred over to an encrypted computer as soon as possible and then securely erased from the recording device. During the transcription of the focus group and interview discussions, all participants will have their names removed and given a unique identifier instead.

All data generated by this research project will be stored in an access-controlled folder on a secured drive on the University's network (X drive). Access to this folder will be granted to the lead researcher, her supervisory team and a member of Public Health Administration team who will be undertaking the transcriptions of the focus groups.

This overall research project forms a feasibility study, which it is hoped will inform the development of a larger trial in the future. Therefore, there may be a need to access the data in the future. Consent for the future use of the data will be explicitly sought via the consent forms. Primary data will be destroyed 5 years after the completion of this PhD.

Section F: Supporting documentation

Information & Consent

Participant information sheets relevant to project?

Yes

| | |
|--|------------------------------|
| Document 1043825 (Version 2) | All versions |
| Document 1043826 (Version 2) | All versions |
| Document 1043827 (Version 2) | All versions |

Consent forms relevant to project?

Yes

| | |
|--|------------------------------|
| Document 1044863 (Version 1) | All versions |
| Document 1044862 (Version 1) | All versions |
| Document 1044861 (Version 1) | All versions |
| Document 1043828 (Version 2) | All versions |
| Document 1043829 (Version 2) | All versions |

Additional Documentation

| | |
|--|------------------------------|
| Document 1043836 (Version 1) | All versions |
| Document 1043834 (Version 2) | All versions |
| Document 1043833 (Version 2) | All versions |
| Document 1043832 (Version 2) | All versions |
| Document 1043831 (Version 1) | All versions |

| | |
|------------------------------|--------------|
| Document 1044865 (Version 1) | All versions |
| Document 1044864 (Version 1) | All versions |
| Document 1043830 (Version 2) | All versions |
| Document 1043838 (Version 1) | All versions |
| Document 1043837 (Version 1) | All versions |
| Document 1043835 (Version 2) | All versions |

External Documentation

- not entered -

Section G: Declaration

Signed by:
Kelly Mackenzie
Date signed:
Wed 23 May 2018 at 16:45

Official notes

- not entered -

c: Phase 3 ethics approval letter



Downloaded: 28/06/2018

Approved: 25/05/2018

Kelly Mackenzie
Registration number: 160215535
School of Health and Related Research
Programme: Health and Related Research (PhD/Health & Related Res FT) - HARR31

Dear Kelly

PROJECT TITLE: Feasibility low-cost, co-produced interventions to reduce workplace sitting time in different organisations (Phase 3)

APPLICATION: Reference Number 019368

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 25/05/2018 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 019368 (dated 23/05/2018).
- Participant information sheet 1043825 version 2 (23/05/2018).
- Participant information sheet 1043826 version 2 (23/05/2018).
- Participant information sheet 1043827 version 2 (23/05/2018).
- Participant consent form 1044863 version 1 (23/05/2018).
- Participant consent form 1044862 version 1 (23/05/2018).
- Participant consent form 1044861 version 1 (23/05/2018).
- Participant consent form 1043828 version 2 (23/05/2018).
- Participant consent form 1043829 version 2 (23/05/2018).

If during the course of the project you need to [deviate significantly from the above-approved documentation](#) please inform me since written approval will be required.

Yours sincerely

Jennifer Burr
Ethics Administrator
School of Health and Related Research

Appendix 14: activPAL logbook and information sheet

activPAL logbook (source Supplementary File 3 [197])

| | |
|--|----------------------|
| | Name: |
| | Assessment #: |
| <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> activPAL serial # _____ </div> | |
| <div style="border: 2px solid red; padding: 20px; margin: 10px auto; width: 80%;"> <h2 style="margin: 0;">Sitting at Work</h2> <h3 style="margin: 0;">Daily Log</h3> </div> | |
| <p>Please keep this booklet in a safe place so you can return it to Kelly</p> | |
| <p>Collection: Xx am on dd/mm/yyyy</p> | |
| <p>If you have any questions or concerns, please contact Kelly Mackenzie on 07740 786072 or email: kelly.mackenzie@sheffield.ac.uk</p> | |
| <p>Sit Less at Work 16/07/2018</p> | |

| <u>Contents</u> | |
|---------------------------------------|---|
| 1. How to fill in the daily log | 3 |
| 2. Daily log (Day 1 to Day 7) | 4 |
| 3. Additional notes (blank) | 6 |

Sit Less at Work 16/07/2018 2

How to fill in the Daily Log

- The log is divided into 7 days, and each day is divided into sleep times, work times, and activPAL3 thigh monitor wear times. Please complete each question for all of the seven days. Please try and be as accurate as possible — record the exact times if you can, or at least to the nearest 5 minutes of your estimated times.
- Start by writing the **date** in the top row.
- Then record your **sleep** time. (i.e., the estimated time that you fell to sleep not the time that you got into bed). This is important as the monitor cannot tell the difference between asleep and awake times, and we are only interested in your activity while you are awake. Please record your sleep time in the morning when you wake up along with your wake time.
- Please record your **One2One work** for today. Please do not include information about any other jobs that you may have. Please record the times you spent **at your workplace** (all of the time, regardless of whether you were working or on a break). By "your workplace" we simply mean the general **One2One building/facilities**. Please additionally report on any times that you worked for **One2One** from elsewhere (e.g., worked from home, attended a meeting at a different worksite), unless this was a very short time (< 30 minutes). If you also do work for a different paid job, please report these work times in the *non-One2One work diary supplement* (p16). Volunteering is important, and home duties are no holiday, but please report on paid work only.
- Finally, please record whether you removed the **activPAL3 thigh monitor** for any reason. If you did remove it, please record the time off and the time on and the reason for removal. Again, this is particularly important as we cannot tell from looking at the data if you are not wearing it or you are lying down.
- Please include any additional information that you may think would be useful for accurately determining your sleep times, work times, and activPAL3 thigh monitor wear times.

Sit Less at Work 16/07/2018 3

| EXAMPLE | Date: 08 / 07 / 2018 | | | | | | | | | | | | | |
|---|---|--|--------------|---------------|----------|--------------|--------------|--|--------------|--------------|--|-----------|-----------|-----------------|
| Sleep | What time did you wake up today? | 7:10 (am/pm) | | | | | | | | | | | | |
| | What time did you get out of bed? | 7:30 (am/pm) | | | | | | | | | | | | |
| | What time did you get into bed? | 11:25 am (pm) | | | | | | | | | | | | |
| | What time did you go to sleep today? | 11:45 am / pm | | | | | | | | | | | | |
| Work | Did work today (for One2One)? | No <input checked="" type="checkbox"/> Yes | | | | | | | | | | | | |
| | Please record all the times you spent at your workplace, and times you worked from elsewhere. (One2One work only) | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Time Started</th> <th>Time Finished</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>9:05 (am/pm)</td> <td>3:35 am / pm</td> <td><input checked="" type="checkbox"/> Workplace <input type="checkbox"/> Other</td> </tr> <tr> <td>4:30 am (pm)</td> <td>5:45 am (pm)</td> <td>Workplace <input checked="" type="checkbox"/> Other home</td> </tr> <tr> <td>: am / pm</td> <td>: am / pm</td> <td>Workplace Other</td> </tr> </tbody> </table> | | | Time Started | Time Finished | Location | 9:05 (am/pm) | 3:35 am / pm | <input checked="" type="checkbox"/> Workplace <input type="checkbox"/> Other | 4:30 am (pm) | 5:45 am (pm) | Workplace <input checked="" type="checkbox"/> Other home | : am / pm | : am / pm | Workplace Other |
| Time Started | Time Finished | Location | | | | | | | | | | | | |
| 9:05 (am/pm) | 3:35 am / pm | <input checked="" type="checkbox"/> Workplace <input type="checkbox"/> Other | | | | | | | | | | | | |
| 4:30 am (pm) | 5:45 am (pm) | Workplace <input checked="" type="checkbox"/> Other home | | | | | | | | | | | | |
| : am / pm | : am / pm | Workplace Other | | | | | | | | | | | | |
| Thigh Monitor | Did you remove your Thigh Monitor today for > 10 minutes? | <input checked="" type="checkbox"/> No Yes <i>If yes, please note time off/on:</i> | | | | | | | | | | | | |
| | Time off: : am / pm | Time on: : am / pm | | | | | | | | | | | | |
| Comments | | | | | | | | | | | | | | |

Sit Less at Work 16/07/2018 4

| DAY 1 | Date: ___ / ___ / ___ | | | | | | | | | | | | | |
|---|---|--|--------------|---------------|----------|-------------|-------------|-----------------|-------------|-------------|-----------------|-------------|-------------|-----------------|
| Sleep | What time did you wake up today? | : : am / pm | | | | | | | | | | | | |
| | What time did you get out of bed? | : : am / pm | | | | | | | | | | | | |
| | What time did you get into bed? | : : am / pm | | | | | | | | | | | | |
| | What time did you go to sleep today? | : : am / pm | | | | | | | | | | | | |
| Work | Did work today (for One2One)? | No Yes | | | | | | | | | | | | |
| | Please record all the times you spent at your workplace, and times you worked from elsewhere. (One2One work only) | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Time Started</th> <th>Time Finished</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>: : am / pm</td> <td>: : am / pm</td> <td>Workplace Other</td> </tr> <tr> <td>: : am / pm</td> <td>: : am / pm</td> <td>Workplace Other</td> </tr> <tr> <td>: : am / pm</td> <td>: : am / pm</td> <td>Workplace Other</td> </tr> </tbody> </table> | | | Time Started | Time Finished | Location | : : am / pm | : : am / pm | Workplace Other | : : am / pm | : : am / pm | Workplace Other | : : am / pm | : : am / pm | Workplace Other |
| Time Started | Time Finished | Location | | | | | | | | | | | | |
| : : am / pm | : : am / pm | Workplace Other | | | | | | | | | | | | |
| : : am / pm | : : am / pm | Workplace Other | | | | | | | | | | | | |
| : : am / pm | : : am / pm | Workplace Other | | | | | | | | | | | | |
| Thigh Monitor | Did you remove your thigh monitor today for > 10 minutes? | <input checked="" type="checkbox"/> No Yes <i>If yes, please note time off/on:</i> | | | | | | | | | | | | |
| | Time off: : am / pm | Time on: : am / pm | | | | | | | | | | | | |
| Comments | | | | | | | | | | | | | | |

Sit Less at Work 16/07/2018 5

| DAY 2 | Date: ___ / ___ / ___ | | | | | | | | | | | | | |
|---|--|--|--------------|---------------|----------|-------------|-------------|-----------------|-------------|-------------|-----------------|-------------|-------------|-----------------|
| Sleep | What time did you wake up today? | : : am / pm | | | | | | | | | | | | |
| | What time did you get out of bed? | : : am / pm | | | | | | | | | | | | |
| | What time did you get into bed? | : : am / pm | | | | | | | | | | | | |
| | What time did you go to sleep today? | : : am / pm | | | | | | | | | | | | |
| Work | Did work today (for [organisation name])? | No Yes | | | | | | | | | | | | |
| | Please record all the times you spent at your workplace, and times you worked from elsewhere. ([organisation name] work only.) | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Time Started</th> <th>Time Finished</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>: : am / pm</td> <td>: : am / pm</td> <td>Workplace Other</td> </tr> <tr> <td>: : am / pm</td> <td>: : am / pm</td> <td>Workplace Other</td> </tr> <tr> <td>: : am / pm</td> <td>: : am / pm</td> <td>Workplace Other</td> </tr> </tbody> </table> | | | Time Started | Time Finished | Location | : : am / pm | : : am / pm | Workplace Other | : : am / pm | : : am / pm | Workplace Other | : : am / pm | : : am / pm | Workplace Other |
| Time Started | Time Finished | Location | | | | | | | | | | | | |
| : : am / pm | : : am / pm | Workplace Other | | | | | | | | | | | | |
| : : am / pm | : : am / pm | Workplace Other | | | | | | | | | | | | |
| : : am / pm | : : am / pm | Workplace Other | | | | | | | | | | | | |
| Thigh Monitor | Did you remove your thigh monitor today for > 10 minutes? | <input checked="" type="checkbox"/> No Yes <i>If yes, please note time off/on:</i> | | | | | | | | | | | | |
| | Time off: : am / pm | Time on: : am / pm | | | | | | | | | | | | |
| Comments | | | | | | | | | | | | | | |

Sit Less at Work 16/07/2018 6

| DAY 3 | Date: ___ / ___ / ___ | | | | | | | | | | | | | |
|---|--|--|--------------|---------------|----------|-------------|-------------|-----------------|-------------|-------------|-----------------|-------------|-------------|-----------------|
| Sleep | What time did you wake up today? | : : am / pm | | | | | | | | | | | | |
| | What time did you get out of bed? | : : am / pm | | | | | | | | | | | | |
| | What time did you get into bed? | : : am / pm | | | | | | | | | | | | |
| | What time did you go to sleep today? | : : am / pm | | | | | | | | | | | | |
| Work | Did work today (for [organisation name])? | No Yes | | | | | | | | | | | | |
| | Please record all the times you spent at your workplace, and times you worked from elsewhere. ([organisation name] work only.) | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Time Started</th> <th>Time Finished</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>: : am / pm</td> <td>: : am / pm</td> <td>Workplace Other</td> </tr> <tr> <td>: : am / pm</td> <td>: : am / pm</td> <td>Workplace Other</td> </tr> <tr> <td>: : am / pm</td> <td>: : am / pm</td> <td>Workplace Other</td> </tr> </tbody> </table> | | | Time Started | Time Finished | Location | : : am / pm | : : am / pm | Workplace Other | : : am / pm | : : am / pm | Workplace Other | : : am / pm | : : am / pm | Workplace Other |
| Time Started | Time Finished | Location | | | | | | | | | | | | |
| : : am / pm | : : am / pm | Workplace Other | | | | | | | | | | | | |
| : : am / pm | : : am / pm | Workplace Other | | | | | | | | | | | | |
| : : am / pm | : : am / pm | Workplace Other | | | | | | | | | | | | |
| Thigh Monitor | Did you remove your thigh monitor today for > 10 minutes? | <input checked="" type="checkbox"/> No Yes <i>If yes, please note time off/on:</i> | | | | | | | | | | | | |
| | Time off: : am / pm | Time on: : am / pm | | | | | | | | | | | | |
| Comments | | | | | | | | | | | | | | |

Sit Less at Work 16/07/2018 7



activPAL3 Thigh Monitor Instructions

How do I wear the monitor?

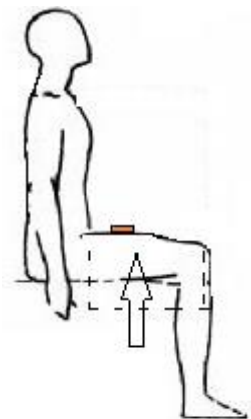
- The activPAL3 thigh monitor is attached directly onto the skin and positioned on the front of the thigh, roughly 1/3 of the way between hip and knee with the stick man standing up (see picture).
- Please wear the monitor **every day for 7 days** removing it on the morning of day 8.
- Please wear the thigh monitor continuously (24 hours/day)
- The thigh monitor can be worn during sleep and is water resistant (to 1m) so you can wear it whilst showering and bathing but please do not wear it in the swimming pool in case it falls off.
- The adhesive patch that sticks the thigh monitor to your skin may last up to 7 days but to avoid skin irritation to may want to change the adhesive patch

Note: The thigh monitor will emit a green flash every 6 seconds. This is an indication that it is working and recording data.



Attaching the monitor

1. Sit down on a chair when attaching the activPAL3 thigh monitor so that your thigh is in a horizontal position. This will also make it easier to find the top of your thigh (the crease between your leg and your upper body).
2. The thigh monitor is to be attached one third of the way down between the top of your thigh and top of your knee. Position the monitor in the midline of your right thigh as shown in the picture.
3. Swab the area where the thigh monitor is to be attached with the provided alcohol pad and let the area dry for a few seconds.
4. Place the thigh monitor in the correct position on the thigh, ensuring that the man on the front of the monitor is standing up (head facing upwards) when you stand up (see top picture).
5. Peel the backing off an adhesive patch (provided in your activity monitor pack) and place it over the thigh monitor. Press the patch onto your skin, starting from the middle out towards the edges and smooth out the air bubbles and wrinkles as much as possible to ensure that the monitor is firmly secured to your thigh.



If you need to change the adhesive patch

During your wear time, you may need to change the adhesive patch which attaches the monitor to your thigh. To do this:

- Remove the monitor from your thigh (note that this may cause some slight discomfort) and peel the adhesive patch off the monitor.
- With an alcohol prep pad provided in your monitor pack, thoroughly wipe down the monitor and the area of your leg where the monitor was attached and follow the same procedure as explained above.
- If you require assistance re-attaching your activPAL3 thigh monitor, please call Kelly Mackenzie on 07740 786072.
- Skin irritations due to the adhesive tape may occur. If this happens, please remove both the dressing and device immediately and inform Kelly on the number above. If the irritation does not improve, please seek medical advice.

What else do I need to do?

- It is important that you fill in the **Daily Log** for the 7 days while you are wearing the activPAL3 thigh monitor.
- This helps us to look specifically at the data from when you were awake.

Returning your Thigh Monitor and Daily Log

- After you have worn your thigh monitor for 7 days, Kelly will arrange a suitable time/place to collect it back from you along with the completed Daily Log and any unused adhesive patches and alcohol wipes.

Other notes:

The activPAL3 thigh monitor is water resistant (to 1m) so you can wear it whilst showering and swimming in a pool, but please do not wear it in the ocean in case it falls off. The thigh monitor will emit a green flash every 6 seconds. This is an indication that it is working and recording data. The activity monitor can be worn through airport security.

Appendix 15: Phase 3 questionnaires for T0, T1 and T2

Sit Less at Work Baseline Questionnaire (T0)

Thanks for agreeing to participate in Phase 3 of the Sit Less at Work Project. I would like to collect some information from you which will be helpful to understand the impacts of the [insert package name here]. Please note, these findings will be analysed as a group. Your data will be anonymised and no individual-level information will be shared with your employer.

This questionnaire should take no longer than 15 minutes to complete.

1. Background Information:

- a) Can you please state your name? _____
- b) Can you please state your home postcode? _____
- c) What is your age? (years) _____
- d) What is your gender? (Please circle)
- | | | |
|------|--------|-------------------------------|
| Male | Female | Other (please specify): _____ |
|------|--------|-------------------------------|
- e) What is your ethnicity? (Please circle)
- | | | |
|-------------------------------|-----------------|--------------------------------|
| White British | Indian | White Irish |
| Pakistani | Bangladeshi | White Gypsy or Irish Traveller |
| Chinese | African | White and Black Caribbean |
| Caribbean | White and Asian | White and Black African |
| Other (please specify): _____ | | |
- f) What is your highest educational attainment? (Please circle)
- | | |
|---------------------------------|-------------------------------|
| Degree or equivalent | No qualification |
| Higher education | Don't know |
| A Level or equivalent | Other (please specify): _____ |
| GCSEs grades A*-C or equivalent | |

2. Lifestyle and General Health Questions:

- a) What is your height? (in feet and inches) _____
- b) What is your weight? (in stones and pounds) _____
- c) Do you smoke? (Please circle)
- | | | | | |
|-----|----|-----------|---|--|
| Yes | No | Ex-smoker | ➔ | <i>If no / ex, skip to question 2e</i> |
|-----|----|-----------|---|--|
- d) How many do you smoke / day? (please circle)
- | | | | | |
|----------|----------|----------|----------|--------------|
| Up to 10 | Up to 20 | Up to 30 | Up to 40 | More than 40 |
|----------|----------|----------|----------|--------------|
- e) Do you eat the recommended 5 portions of fruit / vegetables per day? (please circle)
- | | | |
|-----|----|----------|
| Yes | No | Not Sure |
|-----|----|----------|
- f) Do you drink alcohol? (Please circle)
- | | | | |
|-----|----|---|-----------------------------------|
| Yes | No | ➔ | <i>If no, skip to question 2h</i> |
|-----|----|---|-----------------------------------|
- g) How many units of alcohol do you drink per week? (Please circle)

1 unit of alcohol is:

- 1/2 pint of ordinary beer, lager or cider (3.5% ABV)
- 1 small glass of wine (125ml of 8% wine)
- 1 single pub measure of spirits (25ml)

- 1-2 units 3-4 units 5-6 units 7-8 units 9-10 units >10 units
- h) Do you consider yourself to have any form of disability? (Please circle)
- Yes No Do not wish to disclose
- i) Do you have any medical conditions? (Please circle)
- Yes No Do not wish to disclose ➔ *If no, skip to question 3a*
- j) Please list any medical conditions that you suffer from: _____
- _____
- _____

3. Time Spent Sitting:

During the last **7 days**, please estimate how much time you usually spend SITTING in each of the following activities on a WORKING day and a NON-WORKING day (please write your answers in the spaces provided):

| | Working Day | | Non-Working Day | |
|--|-------------|---------|-----------------|---------|
| | Hours | Minutes | Hours | Minutes |
| a) For TRANSPORT (e.g., in car, bus, train, etc) | _____ | _____ | _____ | _____ |
| b) At WORK (e.g., sitting at a desk or using a computer) | _____ | _____ | _____ | _____ |
| c) Watching TV | _____ | _____ | _____ | _____ |
| d) Using a computer at HOME (e.g., email, games, information, chatting) | _____ | _____ | _____ | _____ |
| e) Other leisure activities (e.g., socialising, movies etc, but NOT including TV or computer use) | _____ | _____ | _____ | _____ |

4. Time Spent Sitting at Work:

- a) How many hours did you work in the last 7 days? _____ hours
- b) During the last 7 days, how many days were you at work? _____ days
- c) How would you describe your typical work day in the last 7 days? (This involves only your work day, and does not include travel to and from work, or what you did in your leisure time)

Example:

Jane is an administrative officer. Her work day involves working on the computer at her desk, answering the phone, filing documents, photocopying, and some walking around the office.

Jane would describe a typical work day in the last 7 days like this:

| | |
|----------|-----|
| Sitting | 90% |
| Standing | 5% |

| | |
|--|------|
| Walking | 5% |
| Heavy labour or physically demanding tasks | 0% |
| Total | 100% |

| | |
|--|---|
| Sitting | % |
| Standing | % |
| Walking | % |
| Heavy labour or physically demanding tasks | % |
| Total | % |

Make sure this adds up to 100%

5. Doing Physical Activity:

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

- a) During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

If no vigorous physical activities → **Skip to question 5c**

- b) How much time did you usually spend doing vigorous physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

- c) During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

If no moderate physical activities → **Skip to question 5e**

- d) How much time did you usually spend doing moderate physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

- e) During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

No walking

f) How much time did you usually spend walking on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

6. General Health and Wellbeing Questions:

a) In general, would you say your health is: (Please circle)

Excellent Very good Good Fair Poor

b) During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**? (Please circle Yes or No)

- Cut down the amount of time you spent on work or other activities Yes No
- Accomplished less than you would like Yes No
- Were limited in the kind of work or other activities Yes No
- Had difficulty performing the work or other activities (e.g., it took extra effort) Yes No

c) During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems**? (Please circle Yes or No)

- Cut down the amount of time you spent on work or other activities Yes No
- Accomplished less than you would like Yes No
- Were limited in the kind of work or other activities Yes No
- Had difficulty performing the work or other activities (e.g., it took extra effort) Yes No

d) How much **bodily** pain have you had during the **past 4 weeks**? (Please circle)

None Very mild Mild Moderate Severe Very severe

e) During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)? (Please circle)

Not at all A little bit Moderately Quite a bit Extremely

These next questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give **the one answer** that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks**... (Please tick one response to each question)

| | All of the time | Most of the time | A good bit of the time | Some of the time | A little of the time | None of the time |
|--|-----------------|------------------|------------------------|------------------|----------------------|------------------|
| f) Have you been a very nervous person? | | | | | | |
| g) Have you felt so down in the dumps that nothing could cheer you up? | | | | | | |
| h) Have you felt calm and peaceful? | | | | | | |
| i) Did you have lots of energy? | | | | | | |

| | | | | | | |
|--|--|--|--|--|--|--|
| j) Have you felt downhearted and blue? | | | | | | |
| k) Did you feel worn out? | | | | | | |
| l) Have you been a happy person? | | | | | | |
| m) Did you feel tired? | | | | | | |

7. Work-related Questions:

- a) What is your job title? _____
- b) Please choose the category that best describes your **main** job. If none of the categories fits exactly, please respond with the closest category to your experience. (Please circle **just one** option)

- Executive, administrator, or senior manager (e.g., CEO, sales VP, plant manager)
- Professional (e.g., engineer, accountant, systems analyst)
- Technical support (e.g., lab technician, legal assistant, computer programmer)
- Sales (e.g., sales representative, stockbroker, retail sales)
- Clerical and administrative support (e.g., secretary, billing clerk, office supervisor)
- Service occupation (e.g., security officer, food service worker, janitor)
- Precision production and crafts worker (e.g., mechanic, carpenter, machinist)
- Chemical/Production Operator (e.g., shift supervisors and hourly employees)
- Labourer (e.g., truck driver, construction worker)

- c) Are you full-time? (Please circle)
- Yes No

- d) If answered no to part 7c above, what is your whole time equivalent (WTE)? _____

The next questions are about the time you spent during your hours at work in the **past 4 weeks** (28 days). Select **one response for each question** that comes closest to your experience.

| | All of the time | Most of the time | Some of the time | A little of the time | None of the time |
|--|-----------------|------------------|------------------|----------------------|------------------|
| e) How often was your performance higher than most workers in your job? | | | | | |
| f) How often was your work performance lower than most workers in your job? | | | | | |
| g) How often did you do no work at times when you were supposed to be working? | | | | | |
| h) How often did you find yourself not working as carefully as you should? | | | | | |
| i) How often was the quality of your work lower than it should have been? | | | | | |
| j) How often did you not concentrate enough on your work? | | | | | |
| k) How often did health problems limit the kind or amount of work you could do? | | | | | |

Now please think of your work experiences over the **past 4 weeks** (28 days). In the spaces provided below, write the number of days you spent in each of the following work situations.

In the **past 4 weeks** (28 days), how many days did you...

| | Number of days this occurred (0-28) |
|---|-------------------------------------|
| l) Miss an entire work day because of problems with your physical or mental health? (Please include only days missed for your own health, not someone else's health) | |
| m) Miss an entire work day for any other reason (including holidays)? | |
| n) Miss part of a work day because of problems with your physical or mental health? (Please do not include entire work days missed. Please include only days missed for your own health, not someone else's health) | |
| o) Miss part of a work day for any other reason (including holidays)? (Please do not include entire work days missed) | |
| p) Come in early, go home late, or work on your day off? | |

Thank you for completing this questionnaire.

Sit Less at Work Project Questionnaire 2 (T1)

Thanks for agreeing to participate in Phase 3 of the Sit Less at Work Project. I would like to collect some information from you which will be helpful to understand the impacts of the [insert package name here]. Please note, these findings will be analysed as a group. Your data will be anonymised and no individual-level information will be shared with your employer.

This questionnaire should take no longer than 15 minutes to complete.

1. Background Information:

Can you please state your name? _____

2. Time Spent Sitting:

During the last **7 days**, please estimate how much time you usually spend SITTING in each of the following activities on a WORKING day and a NON-WORKING day (please write your answers in the spaces provided):

| | Working Day | | Non-Working Day | |
|--|-------------|---------|-----------------|---------|
| | Hours | Minutes | Hours | Minutes |
| a) For TRANSPORT (e.g., in car, bus, train, etc) | _____ | _____ | _____ | _____ |
| b) At WORK (e.g., sitting at a desk or using a computer) | _____ | _____ | _____ | _____ |
| c) Watching TV | _____ | _____ | _____ | _____ |
| d) Using a computer at HOME (e.g., email, games, information, chatting) | _____ | _____ | _____ | _____ |
| e) Other leisure activities (e.g., socialising, movies etc, but NOT including TV or computer use) | _____ | _____ | _____ | _____ |

3. Time Spent Sitting at Work:

a) How many hours did you work in the last 7 days? _____ hours

b) During the last 7 days, how many days were you at work? _____ days

c) How would you describe your typical work day in the last 7 days? (This involves only your work day, and does not include travel to and from work, or what you did in your leisure time)

Example:

Jane is an administrative officer. Her work day involves working on the computer at her desk, answering the phone, filing documents, photocopying, and some walking around the office.

Jane would describe a typical work day in the last 7 days like this:

| | |
|--|------|
| Sitting | 90% |
| Standing | 5% |
| Walking | 5% |
| Heavy labour or physically demanding tasks | 0% |
| Total | 100% |

| | |
|--|---|
| Sitting | % |
| Standing | % |
| Walking | % |
| Heavy labour or physically demanding tasks | % |
| Total | % |

Make sure this adds up to 100%

4. Time Spent Doing Physical Activity:

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

- a) During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

If no vigorous physical activities → **Skip to question 4c**

- b) How much time did you usually spend doing vigorous physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

- c) During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

If no moderate physical activities → **Skip to question 4e**

- d) How much time did you usually spend doing moderate physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

e) During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

No walking

f) How much time did you usually spend walking on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

5. General Health and Wellbeing Questions:

a) In general, would you say your health is: (Please circle)

Excellent Very good Good Fair Poor

b) During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**? (Please circle Yes or No)

- Cut down the amount of time you spent on work or other activities Yes No
- Accomplished less than you would like Yes No
- Were limited in the kind of work or other activities Yes No
- Had difficulty performing the work or other activities (e.g., it took extra effort) Yes No

c) During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems**? (Please circle Yes or No)

- Cut down the amount of time you spent on work or other activities Yes No
- Accomplished less than you would like Yes No
- Were limited in the kind of work or other activities Yes No
- Had difficulty performing the work or other activities (e.g., it took extra effort) Yes No

d) How much **bodily** pain have you had during the **past 4 weeks**? (Please circle)

None Very mild Mild Moderate Severe Very severe

e) During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)? (Please circle)

Not at all A little bit Moderately Quite a bit Extremely

These next questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks**... (Please tick one response to each question)

| | All of the time | Most of the time | A good bit of the time | Some of the time | A little of the time | None of the time |
|--|-----------------|------------------|------------------------|------------------|----------------------|------------------|
| f) Have you been a very nervous person? | | | | | | |
| g) Have you felt so down in the dumps that nothing could cheer you up? | | | | | | |

| | | | | | | |
|--|--|--|--|--|--|--|
| h) Have you felt calm and peaceful? | | | | | | |
| i) Did you have lots of energy? | | | | | | |
| j) Have you felt downhearted and blue? | | | | | | |
| k) Did you feel worn out? | | | | | | |
| l) Have you been a happy person? | | | | | | |
| m) Did you feel tired? | | | | | | |

6. Work-related Questions:

- a) What is your job title? _____
- b) Please choose the category that best describes your **main** job. If none of the categories fits exactly, please respond with the closest category to your experience. (Please circle **just one** option)

Executive, administrator, or senior manager (e.g., CEO, sales VP, plant manager)

Professional (e.g., engineer, accountant, systems analyst)

Technical support (e.g., lab technician, legal assistant, computer programmer)

Sales (e.g., sales representative, stockbroker, retail sales)

Clerical and administrative support (e.g., secretary, billing clerk, office supervisor)

Service occupation (e.g., security officer, food service worker, janitor)

Precision production and crafts worker (e.g., mechanic, carpenter, machinist)

Chemical/Production Operator (e.g., shift supervisors and hourly employees)

Labourer (e.g., truck driver, construction worker)

- c) Are you full-time? (Please circle)

Yes

No

- d) If answered no to part 6c above, what is your whole time equivalent (WTE)? _____

The next questions are about the time you spent during your hours at work in the **past 4 weeks** (28 days). Select **one response for each question** that comes closest to your experience.

| | All of the time | Most of the time | Some of the time | A little of the time | None of the time |
|--|-----------------|------------------|------------------|----------------------|------------------|
| e) How often was your performance higher than most workers in your job? | | | | | |
| f) How often was your work performance lower than most workers in your job? | | | | | |
| g) How often did you do no work at times when you were supposed to be working? | | | | | |
| h) How often did you find yourself not working as carefully as you should? | | | | | |
| i) How often was the quality of your work lower than it should have been? | | | | | |

| | | | | | |
|---|--|--|--|--|--|
| j) How often did you not concentrate enough on your work? | | | | | |
| k) How often did health problems limit the kind or amount of work you could do? | | | | | |

Now please think of your work experiences over the **past 4 weeks** (28 days). In the spaces provided below, write the number of days you spent in each of the following work situations.

In the **past 4 weeks** (28 days), how many days did you...

| | Number of days this occurred (0-28) |
|---|-------------------------------------|
| l) Miss an entire work day because of problems with your physical or mental health? (Please include only days missed for your own health, not someone else's health) | |
| m) Miss an entire work day for any other reason (including vacation)? | |
| n) Miss part of a work day because of problems with your physical or mental health? (Please do not include entire work days missed. Please include only days missed for your own health, not someone else's health) | |
| o) Miss part of a work day for any other reason (including vacation)? (Please do not include entire work days missed) | |
| p) Come in early, go home late, or work on your day off? | |

7. Feedback about [insert package name here]:

a) Did you notice any of the following changes in your workplace to help you sit less at work? (Please circle the changes that you were aware of)

[Intervention element 1]

[Intervention element 2]... etc

I was not aware of any of the changes above **➡ Skip to question 7h**

b) If so, what aspects did you like most about the changes? _____

c) What aspects did you like least about the changes? _____

d) Do you feel that the changes altered the way you thought about how much time you spend sitting at work?

e) Do you feel that the changes helped you to change the amount of time you spend sitting at work?

f) Are you aware of any health and safety incidents as a result of [insert package name here]?

Yes No Don't know ➡ ***If No or Don't know, skip to question 7h***

g) Can you please provide the details of these health and safety incidents?

h) Do you feel that anything could have been done differently to help you sit less at work? If so, what might that have been?

i) Any other comments?

Thank you for completing this questionnaire.

Sit Less at Work Project Questionnaire 3 (T2)

Thanks for agreeing to participate in Phase 3 of the Sit Less at Work Project. I would like to collect some information from you which will be helpful to understand the impacts of the [insert package name here]. Please note, these findings will be analysed as a group. Your data will be anonymised and no individual-level information will be shared with your employer.

This questionnaire should take no longer than 15 minutes to complete.

1. Background Information:

Can you please state your name? _____

2. Time Spent Sitting:

During the last **7 days**, please estimate how much time you usually spend SITTING in each of the following activities on a WORKING day and a NON-WORKING day (please write your answers in the spaces provided):

| | Working Day | | Non-Working Day | |
|--|-------------|---------|-----------------|---------|
| | Hours | Minutes | Hours | Minutes |
| a) For TRANSPORT (e.g., in car, bus, train, etc) | _____ | _____ | _____ | _____ |
| b) At WORK (e.g., sitting at a desk or using a computer) | _____ | _____ | _____ | _____ |
| c) Watching TV | _____ | _____ | _____ | _____ |
| d) Using a computer at HOME (e.g., email, games, information, chatting) | _____ | _____ | _____ | _____ |
| e) Other leisure activities (e.g., socialising, movies etc, but NOT including TV or computer use) | _____ | _____ | _____ | _____ |

3. Time Spent Sitting at Work:

- How many hours did you work in the last 7 days? _____ hours
- During the last 7 days, how many days were you at work? _____ days
- How would you describe your typical work day in the last 7 days? (This involves only your work day, and does not include travel to and from work, or what you did in your leisure time)

Example:

Jane is an administrative officer. Her work day involves working on the computer at her desk, answering the phone, filing documents, photocopying, and some walking around the office.

Jane would describe a typical work day in the last 7 days like this:

| | |
|----------|-----|
| Sitting | 90% |
| Standing | 5% |
| Walking | 5% |

| | |
|--|------|
| Heavy labour or physically demanding tasks | 0% |
| Total | 100% |

| | |
|--|---|
| Sitting | % |
| Standing | % |
| Walking | % |
| Heavy labour or physically demanding tasks | % |
| Total | % |

Make sure this adds up to 100%

4. Time Spent Doing Physical Activity:

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

- a) During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

If no vigorous physical activities → **Skip to question 4c**

- b) How much time did you usually spend doing vigorous physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

- c) During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

If no moderate physical activities → **Skip to question 4e**

- d) How much time did you usually spend doing moderate physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

- e) During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a

time?

_____ **days per week**

No walking

f) How much time did you usually spend walking on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

5. General Health and Wellbeing Questions:

a) In general, would you say your health is: (Please circle)

Excellent Very good Good Fair Poor

b) During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of your physical health?** (Please circle Yes or No)

- Cut down the amount of time you spent on work or other activities Yes No
- Accomplished less than you would like Yes No
- Were limited in the kind of work or other activities Yes No
- Had difficulty performing the work or other activities (e.g., it took extra effort) Yes No

c) During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems?** (Please circle Yes or No)

- Cut down the amount of time you spent on work or other activities Yes No
- Accomplished less than you would like Yes No
- Were limited in the kind of work or other activities Yes No
- Had difficulty performing the work or other activities (e.g., it took extra effort) Yes No

d) How much **bodily** pain have you had during the **past 4 weeks?** (Please circle)

None Very mild Mild Moderate Severe Very severe

e) During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)? (Please circle)

Not at all A little bit Moderately Quite a bit Extremely

These next questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks**... (Please tick one response to each question)

| | All of the time | Most of the time | A good bit of the time | Some of the time | A little of the time | None of the time |
|--|-----------------|------------------|------------------------|------------------|----------------------|------------------|
| f) Have you been a very nervous person? | | | | | | |
| g) Have you felt so down in the dumps that nothing could cheer you up? | | | | | | |

| | | | | | | |
|--|--|--|--|--|--|--|
| h) Have you felt calm and peaceful? | | | | | | |
| i) Did you have lots of energy? | | | | | | |
| j) Have you felt downhearted and blue? | | | | | | |
| k) Did you feel worn out? | | | | | | |
| l) Have you been a happy person? | | | | | | |
| m) Did you feel tired? | | | | | | |

6. Work-related Questions:

a) What is your job title? _____

b) Please choose the category that best describes your **main** job. If none of the categories fits exactly, please respond with the closest category to your experience. (Please circle **just one** option)

Executive, administrator, or senior manager (e.g., CEO, sales VP, plant manager)

Professional (e.g., engineer, accountant, systems analyst)

Technical support (e.g., lab technician, legal assistant, computer programmer)

Sales (e.g., sales representative, stockbroker, retail sales)

Clerical and administrative support (e.g., secretary, billing clerk, office supervisor)

Service occupation (e.g., security officer, food service worker, janitor)

Precision production and crafts worker (e.g., mechanic, carpenter, machinist)

Chemical/Production Operator (e.g., shift supervisors and hourly employees)

Labourer (e.g., truck driver, construction worker)

c) Are you full-time? (Please circle)

Yes No

d) If answered no to part 6c above, what is your whole time equivalent (WTE)? _____

The next questions are about the time you spent during your hours at work in the **past 4 weeks** (28 days). Select **one response for each question** that comes closest to your experience.

| | All of the time | Most of the time | Some of the time | A little of the time | None of the time |
|--|-----------------|------------------|------------------|----------------------|------------------|
| e) How often was your performance higher than most workers in your job? | | | | | |
| f) How often was your work performance lower than most workers in your job? | | | | | |
| g) How often did you do no work at times when you were supposed to be working? | | | | | |
| h) How often did you find yourself not working as carefully as you should? | | | | | |
| i) How often was the quality of your work lower than it should have been? | | | | | |
| j) How often did you not concentrate enough on your work? | | | | | |

| | | | | | |
|---|--|--|--|--|--|
| k) How often did health problems limit the kind or amount of work you could do? | | | | | |
|---|--|--|--|--|--|

Now please think of your work experiences over the **past 4 weeks** (28 days). In the spaces provided below, write the number of days you spent in each of the following work situations.

In the **past 4 weeks** (28 days), how many days did you...

| | Number of days this occurred (0-28) |
|---|-------------------------------------|
| l) Miss an entire work day because of problems with your physical or mental health? (Please include only days missed for your own health, not someone else's health) | |
| m) Miss an entire work day for any other reason (including holiday)? | |
| n) Miss part of a work day because of problems with your physical or mental health? (Please do not include entire work days missed. Please include only days missed for your own health, not someone else's health) | |
| o) Miss part of a work day for any other reason (including holiday)? (Please do not include entire work days missed) | |
| p) Come in early, go home late, or work on your day off? | |

7. Feedback about [insert package name here]:

a) Did you notice any of the following changes in your workplace to help you sit less at work which began in [enter date]? (Please circle the changes that you were aware of)

[Intervention element 1]

[Intervention element 2]... etc

I was not aware of any of the changes above **➡ Skip to question 7j**

b) Are any of these changes still in place? (Please circle)

Yes

No

Don't know

➡ If No or Don't know, skip to question 7g

c) Which changes are still in place? (Please circle all that apply)

[Intervention element 1]

[Intervention element 2]... etc

d) Are you still actively participating in any of these changes? (Please circle)

Yes

No

➡ If No, skip to question 7g

e) Which changes are you still actively participating in? (Please circle all that apply)

[Intervention element 1]

[Intervention element 2]... etc

f) Why are you still participating in these changes?

g) What do you think helped or could have helped these changes to continue?

h) Are you aware of any health and safety incidents as a result of [insert package name here]?

Yes

No

Don't know



If No or Don't know, skip to question

7j

i) Can you please provide the details of these health and safety incidents?

j) Do you feel that anything could have been done differently to help you sit less at work? If so, what might that have been?

k) Any other comments?

Thank you for completing this questionnaire.

Appendix 16: Phase 3 focus group/interview questionnaire

Thanks for agreeing to participate in Phase 3 of the Sit Less at Work Project. I would like to collect some background information in order to help me interpret the findings from the discussion.

This questionnaire should take no longer than 5 minutes to complete.

8. Can you please state your home postcode? _____

9. What is your age? _____

10. What is your gender? (Please circle)

Male

Female

Other (please specify): _____

11. What is your ethnicity? (Please circle)

White British

Indian

White Irish

Pakistani

White Gypsy or Irish Traveller

Bangladeshi

White and Black Caribbean

Chinese

White and Black African

African

White and Asian

Caribbean

Other (please specify): _____

12. What is your highest educational attainment? (Please circle)

Degree or equivalent

No qualification

Higher education

Don't know

A Level or equivalent

Other (please specify): _____

GCSEs grades A*-C or equivalent

13. What is your job title? _____

14. Briefly describe your job role: _____

15. Are you full-time? (Please circle)

Yes

No

16. If answered no to question 8 above, what is your whole time equivalent (WTE)? _____

17. Approximately, how much of an average day do you spend sitting whilst at work? (Please circle)

0-25%

25-50%

50-75%

75-100

Thank you for completing this questionnaire.

Appendix 17: Phase 3 topic guides for focus groups and interviews

Topic guide for post-intervention focus groups with participants

Aim of these focus groups:

- To gain in-depth qualitative feedback on the feasibility of the interventions and outcome measures from a sub-group of the participants.

Prior to beginning the focus group discussions, "ground-rules" will be set with agreement of the participants which will include keeping information discussed during the focus group between the group only.

1. General thoughts of the intervention, "Sit Less at...", as a whole
 - a. What were your thoughts about the intervention? Prompts if required:
 - i. What motivated you to get involved with this intervention?
 - ii. Did you enjoy it?
 - iii. How did it make you feel about yourself? About your organisation?
 - iv. Would you recommend it to friends/other organisations? Why?
2. Outcomes as a result of "Sit Less at..."
 - a. Did you feel or notice any changes as a result of participating in the intervention? Prompts if required:
 - i. Positive – feel better, sitting less, moving more, more productive, less stress, comradery with team, change/enhance the culture of the organisation
 - ii. Negative – less productive, health and safety incidents, negative comments/responses from colleagues or managers
 - iii. Broader impacts – more or less physically active outside of work, changes to diet, mental health changes
3. The feasibility of the various elements of the intervention – remind participants of the various elements of the intervention (show the action plan)
 - a. Did you feel that the various bits of the intervention were "do-able"/achievable? Why/why not? Prompt if required:
 - i. Barriers and enablers e.g., time, cost, management support, organisation support, fit into existing routine, environment
 - ii. Homeworking [if applicable] – how did this effect participation in the various bits of the intervention?
4. The acceptability of the various elements of the intervention and outcome measures
 - a. How did you find the various bits of the intervention? Prompt if required:
 - i. Did you like them or not, were they engaging, enjoyable, motivating, obtrusive, annoying?
 - b. Do you have any thoughts as to why some people didn't engage with the intervention? Did that impact you in anyway?
 - c. How was information about the intervention (not including information from me) communicated to you? Was it enough, too little or too much?
 - d. Thinking about the measures used as part of this research:

- i. What were your thoughts about the devices used to measure sitting time? Were they ok to use? Why/why not? Any thoughts about the logbooks?
 - ii. What were your thoughts about the online questionnaires? Were they too long/too short/about right? Were they easy to complete?
5. Elements of the intervention that did/did not work, improvements
 - a. What were the bits that worked well for you and what not so well? Prompt if required:
 - i. How did management (top-level and middle management) support the intervention?
 - ii. Were individual activities or team-based activities preferred?
 - b. Is there anything that you would change about the intervention? Why/why not?
6. Which elements or behaviour changes have remained since the end of the intervention?
 - a. What has happened since the end of the intervention? Have you maintained any changes or activities? Why/why not?
 - b. What would make you continue?
7. Any other comments or thoughts?

Thank you for taking part!

Topic guide for post-intervention and intervention development focus groups with participants

Aim of these focus groups:

- To gain in-depth qualitative feedback on the feasibility of the interventions and outcome measures from a sub-group of the participants.

Prior to beginning the focus group discussions, "ground-rules" will be set with agreement of the participants which will include keeping information discussed during the focus group between the group only.

1. General thoughts of the intervention, "Sit Less at...", as a whole
 - a. What were your thoughts about the intervention? Prompts if required:
 - i. What motivated you to get involved with this intervention?
 - ii. Did you enjoy it?
 - iii. How did it make you feel about yourself? About your organisation?
 - iv. Would you recommend it to friends/other organisations? Why?
2. Implementation of "Sit Less at..."
 - a. Do you have any insight into how the intervention was rolled out? Prompt if required:
 - i. Who was involved in driving the intervention?
 - ii. Was it one person or same group of people?
 - iii. Was there any absorption i.e., did others start to initiate activities after experiencing them?
 - b. Do you feel that the intervention that was rolled out was consistent with what you had originally planned?
 - i. What was the same? What was different?
 - ii. Were you aware of any different ideas or activities that developed during the course of the intervention that was not part of the original action plan? In the workplace / home / leisure?
 - iii. Anything you would change about the content or roll-out of the intervention?
 - c. What are your thoughts on who participated in the intervention?
 - i. Any specific departments / teams / types of people more or less engaged?
 - ii. Any idea of number of people?
 - iii. What about how people participated? Was it an individual choice or was it led/controlled by someone?
3. Barriers and enablers to the roll-out of the intervention
 - a. Did anything hinder the roll-out of the intervention?
 - i. Cost, time, no one leading it, lack of management support, lack of participation, any push-back or resistance to activities or the intervention as a whole?
 - b. Did anything particularly support the roll-out of the intervention?
 - i. Management support, leadership, staff engagement, any change in the culture regarding sitting less and moving more at work
 - c. Which activities do you feel were more or less successful? Why?
4. Outcomes as a result of "Sit Less at..."
 - a. Did you feel or notice any changes as a result of the intervention? Prompts if required:

- i. Positive – feel better, sitting less, moving more, more productive, less stress, comradery with team, change/enhance the culture of the organisation
 - ii. Negative – less productive, health and safety incidents, negative comments/responses from colleagues or managers
 - iii. Broader impacts – more or less physically active outside of work, changes to diet, mental health changes
- 5. The feasibility of the various elements of the intervention – remind participants of the various elements of the intervention (show the action plan)
 - a. Did you feel that the various bits of the intervention were “do-able”/achievable? Why/why not? Prompt if required:
 - i. Barriers and enablers e.g., time, cost, management support, organisation support, fit into existing routine, environment
 - ii. Homeworking [if applicable] – how did this effect participation in the various bits of the intervention?
- 6. The acceptability of the various elements of the intervention and outcome measures
 - a. How did you find the various bits of the intervention? Prompt if required:
 - i. Did you like them or not, were they engaging, enjoyable, motivating, obtrusive, annoying?
 - b. Do you have any thoughts as to why some people didn’t engage with the intervention? Did that impact you in anyway?
 - c. How was information about the intervention (not including information from me) communicated to you? Was it enough, too little or too much?
 - d. Thinking about the measures used as part of this research:
 - i. What were your thoughts about the devices used to measure sitting time? Were they ok to use? Why/why not? Any thoughts about the logbooks?
 - ii. What were your thoughts about the online questionnaires? Were they too long/too short/about right? Were they easy to complete?
- 7. Elements of the intervention that did/did not work, improvements
 - a. What were the bits that worked well for you and what not so well? Prompt if required:
 - i. How did management (top-level and middle management) support the intervention?
 - ii. Were individual activities or team-based activities preferred?
 - b. Is there anything that you would change about the intervention? Why/why not?
- 8. Which elements or behaviour changes have remained since the end of the intervention?
 - a. What has happened since the end of the intervention? Have you maintained any changes or activities? Why/why not?
 - b. What would make you continue?
- 9. Any other comments or thoughts?

Thank you for taking part!

Topic guide for post-intervention interviews with the intervention implementer

Aim of these interviews:

- To undertake a process evaluation to understand how the intervention was implemented, what parts of the intervention were implemented, and what supported or hindered the implementation process from members of the intervention development team perspective

1. General perceptions about “Sit Less at...”

- a. What were your thoughts about the idea of sitting less at work? Positive and negative?
- b. What were your thoughts about the intervention? Positive and negative?

2. Implementation of “Sit Less at...”

- a. How do you feel the roll-out of the intervention went?
- b. Do you feel that the intervention that was rolled out was consistent with what had been originally planned (show action plan as a prompt)?
 - i. What was the same? What was different?
 - ii. Were you aware of any different ideas or activities that developed during the course of the intervention that were not part of the original action plan? In the workplace / home / leisure?
 - iii. Anything you would change about the content or roll-out of the intervention?
- c. What are your thoughts on who participated in the intervention?
 - i. Any specific departments / teams / types of people more or less engaged?
 - ii. Any idea of number of people?
 - iii. What about how people participated? Was it an individual choice or was it led /controlled by someone?

3. Barriers and enablers to the roll-out of the intervention

- a. Did anything hinder the roll-out of the intervention?
 - i. Cost, time, no one leading it, lack of management support, lack of participation, any push-back or resistance to activities or the intervention as a whole?
- b. Did anything particularly support the roll-out of the intervention?
 - i. Management support, leadership, staff engagement, any change in the culture regarding sitting less and moving more at work
- c. Which activities do you feel were more or less successful? Why? Any impact?

4. Any other thoughts or comments?

Thanks for taking part!

Topic guide for post-intervention interviews with key personnel

Interviews will be conducted with key personnel in each organisation, e.g., a staff member from human resources and occupational health, and a managing director or chief executive with the aim of:

- Undertaking a process evaluation to understand how the intervention was implemented, what supported or hindered the implementation process, and what the impact of the intervention was in the organisation from the perspective of key personnel in the organisation

Introductory question: Can you describe your role in the organisation?

1. General perceptions about “Sit Less at...”

- a. Were you aware that the intervention, “Sit Less at...”, had been rolled-out in your organisation? [If “No”, go to section at the end]
- b. What were your thoughts about the intervention? Positive and negative? Did you participate yourself? Which activities do you feel were more or less successful? Why?
- c. How do you feel the intervention was perceived by your colleagues in senior roles?
- d. How does this intervention fit in with the organisation’s priorities / existing strategies or policies?

2. Implementation of “Sit Less at...”

- a. Do you know how the intervention was rolled-out in your organisation i.e., who was involved in driving the intervention? [if no, describe the implementation process]
- b. Do you have any thoughts on how the intervention was rolled-out? What could have been done differently to gain a larger impact?
- c. What are your thoughts on who participated in the intervention?
 - i. Any specific departments / teams / types of people more or less engaged?
 - ii. Any idea of number of people?
 - iii. Did you notice any different rates of uptake in staff with different job roles / working patterns?
 - iv. What about how people participated? Was it an individual choice or was it led/controlled by someone?

3. Feasibility and acceptability of intervention

- a. Do you feel that the various bits of the intervention were “do-able”/achievable? Why/why not? Prompt if required:
 - i. Barriers and enablers e.g., time, cost, management support, organisation support, fit into existing routine, environment
 - ii. Homeworking [if applicable] – how did this effect participation in the various bits of the intervention?
- b. How do you feel that your staff found the intervention? Prompt if required:
 - i. Did they like it or not, was it engaging, enjoyable, motivating, obtrusive, annoying?
 - ii. Do you have any thoughts as to why some people didn’t engage with the intervention?
 - iii. Any health and safety incidents?

4. Barriers and enablers to the roll-out of the intervention
 - a. Did anything hinder the roll-out of the intervention?
 - i. Cost, time, no one leading it, lack of management support, lack of participation, any push-back or resistance to activities or the intervention as a whole (from any specific groups of staff / teams / departments?)
 - b. Did anything particularly support the roll-out of the intervention?
 - i. Management support, leadership, staff engagement, any change in the culture regarding sitting less and moving more at work

5. Impacts of "Sit Less at..."
 - a. What are the measures of success from your perspective – [prompt if required] productivity, staff morale, health, cost/benefits?
 - b. What would convince you to participate / support the ongoing running of the intervention? What outputs would you need to see?
 - c. Is this intervention something you would be keen to adopt long-term? What is the potential to carry it on?
 - d. Are there any other workplace policies that might impact positively or negatively on the intervention in the future? E.g., something relating to disabled staff, equality and diversity, health and safety.

6. Any other thoughts or comments?

Thank you for taking part!

Appendix 18: Individual-level primary outcome data

The tables below demonstrate the percentage sitting time at work for each participant in the small business, charity and local authority at each of the data collection time points (T0, T1 and T2). Note, “NR” means no data were recorded at that time point (either due to non-participation or device error).

Table 1: Individual-level data for small business

| Small business participant | % sitting time at work at T0 | % sitting time at work at T1 | % sitting time at work at T2 |
|----------------------------|------------------------------|------------------------------|------------------------------|
| 1 | 76.07 | 74.11 | 77.86 |
| 2 | 91.69 | NR | 88.01 |
| 3 | 88.50 | 81.06 | NR |
| 4 | 65.79 | 69.80 | NR |
| 5 | 86.05 | 84.24 | NR |

Table 2: individual-level data for charity

| Charity participant | % sitting time at work at T0 | % sitting time at work at T1 | % sitting time at work at T2 |
|---------------------|------------------------------|------------------------------|------------------------------|
| 1 | 82.13 | 79.52 | 80.79 |
| 2 | 58.67 | 65.23 | 41.93 |
| 3 | 63.07 | 73.64 | 61.69 |
| 4 | 79.71 | 79.99 | 75.05 |
| 5 | 82.66 | NR | NR |
| 6 | 81.60 | 75.12 | 86.51 |
| 7 | 66.77 | 74.72 | NR |
| 8 | 81.65 | 86.65 | 73.48 |
| 9 | 73.00 | 79.01 | 85.55 |
| 10 | 83.59 | NR | 67.67 |

Table 3: Individual-level data for local authority

| Local authority participant | % sitting time at work at T0 | % sitting time at work at T1 | % sitting time at work at T2 |
|-----------------------------|------------------------------|------------------------------|------------------------------|
| 1 | 81.27 | 82.70 | NR |
| 2 | 60.41 | 87.66 | NR |
| 3 | 79.22 | 62.41 | 70.01 |
| 4 | 86.66 | 39.01 | 36.67 |
| 5 | 54.31 | NR | NR |
| 6 | 83.61 | 85.42 | 66.19 |
| 7 | 48.68 | NR | NR |
| 8 | 69.36 | NR | NR |
| 9 | 61.13 | 80.81 | 82.70 |
| 10 | 46.22 | 75.22 | 72.14 |

| | | | | |
|----|----|-------|-------|-------|
| 11 | | 73.86 | 78.95 | 55.18 |
| 12 | | 69.80 | 34.10 | NR |
| 13 | | 75.73 | 79.75 | 73.83 |
| 14 | | 71.08 | 47.80 | 52.60 |
| 15 | | 74.00 | 76.66 | 79.74 |
| 16 | | 65.09 | NR | NR |
| 17 | | 79.25 | 79.25 | 74.27 |
| 18 | | 73.15 | 70.83 | NR |
| 19 | | 92.69 | 81.04 | 80.53 |
| 20 | | 77.99 | 74.78 | 86.37 |
| 21 | | 85.76 | NR | NR |
| 22 | | 83.20 | 85.53 | NR |
| 23 | | 33.29 | 76.76 | 52.00 |
| 24 | | 69.13 | 75.46 | 68.20 |
| 25 | NR | | 53.40 | 32.49 |
| 26 | | 71.04 | 79.37 | NR |
| 27 | | 67.85 | 78.04 | 73.08 |
| 28 | | 72.74 | NR | NR |
| 29 | | 73.98 | 77.06 | NR |
| 30 | | 66.33 | NR | NR |
| 31 | | 77.59 | 81.21 | 77.84 |
| 32 | | 66.33 | NR | NR |
| 33 | | 90.74 | 72.20 | NR |
| 34 | | 35.57 | 64.93 | 61.82 |
| 35 | | 92.92 | NR | NR |
| 36 | | 79.92 | 81.84 | 86.69 |
| 37 | | 76.23 | 74.46 | 55.13 |
| 38 | | 80.97 | 88.19 | 85.63 |
| 39 | | 79.40 | NR | NR |

Appendix 19: Posters used by local authority as part of the “Sit Less at Work” intervention

Below are three posters which were placed in meeting rooms and near printers/photocopiers during the intervention period in the local authority. Please note, black boxes cover up the name of the local authority.



